ensoniq®

EPS
Performance Sampler

Advanced Applications Guide
Version 1.3

ADVANCED APPLICATIONS GUIDE

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"This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been designed to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures."

* reorient the receiving antenna
* relocate the instrument with respect to the receiver
* move the instrument away from the receiver
* plug the instrument into a different outlet so that the instrument and receiver are on different branch circuits

"If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful: 'How to Identify and Resolve Radio-TV Interference Problems.' This booklet is available from the U.S. Government printing Office, Washington, D.C. 20402 Stock No. 004-000-00345-4."

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ABOUT THE ADVANCED APPLICATIONS GUIDE (AAG)

To get the most from your EPS, read the *Musician's Manual* first. It covers many of the basic functions of the instrument. Then, when you are ready to get into the EPS on a deeper level, open the *AAG*. The *AAG* is designed for both reading and referencing. The tutorial sections are conversational, while the remaining sections are more direct. The table of contents is organized to make referencing easy, much like an index. To keep the *AAG* streamlined, we have avoided repeating information which can be found in the *Musician's Manual*. As a result, the *AAG* does not replace the *Musician's Manual*, it augments it. The Command/Parameter Reference card, *Musician's Manual*, and *AAG* are your keys to unleashing the great potential of the EPS.

THE EPS USER INTERFACE: HOW TO GET AROUND

MODES AND PAGES

While the EPS may appear to be quite complex, all of its functions follow a few simple rules. Once you have learned how the machine is organized, you should be able to do what you want to do without constantly referring to the manual. Most of the operations of the machine are divided into three modes: LOAD, COMMAND, and EDIT. The few functions and shortcuts which do not follow all the rules are grouped under the headings SPECIAL COMMAND SHORTCUTS and NUMBER KEYS.

The Mode is selected by pressing one of the three orange buttons. Each Mode has a set of Pages; these Pages are accessed by pressing one of the fourteen grey Page buttons. Once on a Page, the Left and Right Arrow buttons can be used to scroll about among the items on that Page. Since each Mode shows a different type of "item," what happens next depends on the Mode.

LOAD MODE

LOAD Mode is explained in detail in the *Musician's Manual* (pages 9 and 10). It has four Pages which show different types of files. Pressing *Enter•Yes* tells the EPS to try to load the file shown in the display. Pressing one of the Instrument•Track buttons will select or deselect a loaded sound. This activity causes a fifth Page to appear, which is just the volume of the last selected Instrument. The *Cancel•No* button will toggle between the volume Page and the directory Pages.

COMMAND MODE

COMMAND Mode is quite simple to use, yet it holds most of the real power of the EPS. As always, the Page buttons select a Page and the Left and Right Arrow buttons scroll through the individual commands. Press *Enter•Yes* to execute the command. Before executing a command, the display may allow you to change some parameters; if so, another *Enter•Yes* or two may be required to finish. If you change your mind halfway through, press *Cancel•No* to "come back out" to COMMAND Mode again.

EDIT MODE

In EDIT Mode, every Page contains a group of parameters; the Left and Right Arrows scroll through them. The Up and Down Arrows will change the value of the current parameter, as will the Data Entry Slider. It's almost as simple as that. The only tricky part is selecting exactly *what* you are editing. The MIDI and SYSTEM Pages contain items which are *global* to the machine; there is only one "master tune" for example. Other parameters pertain to the current Instrument, Layer, Wavesample, Song, Sequence, or Track. Pressing the *Edit* button itself shows you the EDIT context for the current Instrument (and Track). This is an important Page and is explained below. The current song or sequence is shown on the EDIT/Seq Page.

SPECIAL COMMAND SHORTCUTS

There are some functions which don't follow the simple procedures set out above for the three Modes. Some are covered in the *Musician's Manual*, like Instrument Stacking and Sampling.

- The *Musician's Manual* covers *Set Keyboard Range* for Instruments. The keyboard range for individual Wavesamples can also be set using the same procedure when this button is pressed from EDIT Mode, with a Wavesample already selected.
- Hold down an Instrument•Track button and press *Cancel•No.* This will cause that Instrument to be deleted from internal memory.
- Hold down an *empty* Instrument•Track button and press *Enter•Yes*. This will cause the currently selected Instrument to be copied to that Track. This is a shortcut for the COPY INSTRUMENT command.
- A file is erased from a disk by holding *Load* and pressing *Cancel•No* while the file name is in the display.
- Sometimes a number of parameters are grouped onto one screen, for example, envelope times or the Instrument Patch Selects. To scroll past the entire screen quickly, hold the Right Arrow and press the Up Arrow. To go backwards, hold the Left Arrow and press the Down Arrow.

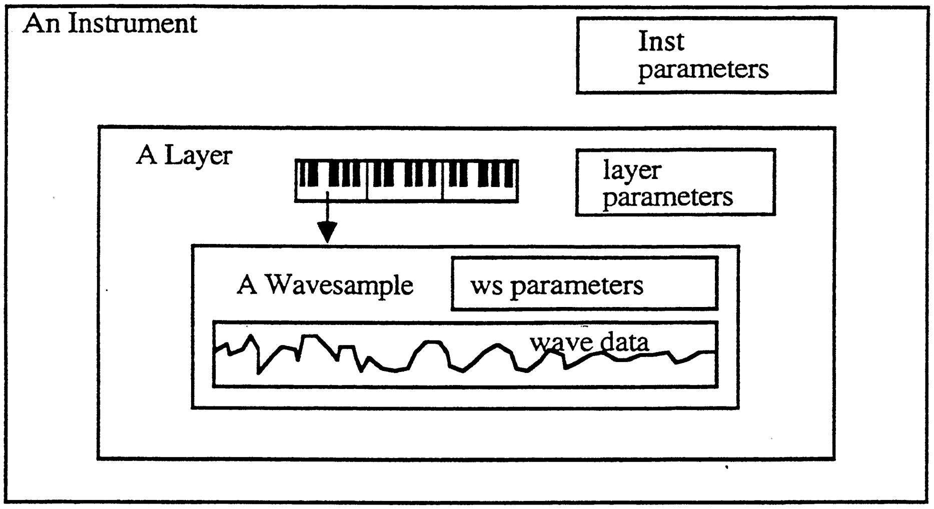
THE NUMBER KEYS: "DIRECT DIALING"

The number keys, which are also Page buttons, allow "direct dialing" of files, commands, and parameters.

- In LOAD Mode, on the Volume Page (LOAD not flashing) the number keys select presets, as explained in the *Musician's Manual.*
- In LOAD Mode, on the Files Pages (LOAD flashing) a file can be brought into the display by punching its two-digit file number.
- In COMMAND Mode, the first ten commands on each page can be selected by pressing a digit 0-9 immediately after a Page button. For example, pressing *Instrument* and then 3 will select SAVE INSTRUMENT. The number must be pressed within one second of the page button press.
- In EDIT Mode, parameters can also be selected by a two button code. For example, 33 will select Env 3, TIMES Page.
- In both EDIT and COMMAND modes, double-clicking on a Page button which does not have a number will still select something useful. For example, pressing *System* twice will select FREE SYSTEM BLOCKS in EDIT Mode. In COMMAND Mode you get FORMAT FLOPPY DISK.

WHAT'S AN INSTRUMENT?

The EPS keeps all its sounds in a format called the Instrument. This format is used for all disk storage. The internal structure of an Instrument has three levels: Instrument, Layer, and Wavesample. Up to 127 Wavesamples are grouped together into Layers, and there can be up to 8 Layers in the Instrument. Their relationship is shown below:



At the Instrument level, there are parameters which affect the whole Instrument; for example the "smart MIDI out" functions and the effect of the Patch Selects. These parameters are found on the EDIT/Instrument Page.

LAYERS AND WAVESAMPLES

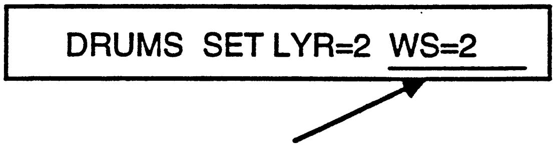
A LAYER contains a map of the keyboard which determines which Wavesample will play on each key. It also has parameters which affect all the Wavesamples of that Layer, such as glide and pitch table selection. These parameters are found on the EDIT/Layer Page.

Finally there is the Wavesample, which contains the bulk of the information for making a sound. Every Wavesample has its *own* set of parameters for envelopes, filters, LFO, etc. It also contains the actual wavedata which becomes the sound. It is possible for two Wavesamples to share the same wavedata (to save memory) but they will always have separate, independent copies of the parameters. The pages that contain Wavesample parameters are: EDIT/Env 1, EDIT/Env 2, EDIT/Env 3, EDIT/Pitch, EDIT/Filter, EDIT/Amp, EDIT/LFO and EDIT/Wave.

EDITING MORE THAN ONE WAVESAMPLE AT ONCE

In EDIT Mode, only one Instrument•Track can be selected. However, because there can be large numbers of Wavesamples inside a single Instrument, the EPS provides two ways of editing *more than one* Wavesample at once.

Pressing the EDIT button selects a special page which shows the EDIT context. The placement of the cursor (underline) on this page determines which type of editing will occur.



DRUMS SET LYR=2 WS=2

When the cursor is under the Wavesample (WS) field, and a number is shown, then you are editing only that Wavesample. Different Wavesamples can be selected by playing keys on the keyboard, or by using the Up/Down Arrows.

DRUMS SET LYR=2 WS=ALL

When the cursor is under the Layer (LYR) field, then you are editing *all* the Wavesamples in the specified Layer. For example, if you went to the EDIT/Amp Page and changed the volume, then the volume in every Wavesample in the Layer would be automatically changed.

DRUMS SET LYR=A WS=ALL

When the cursor is under the Instrument field (which shows the first 9 letters of the Instrument's name) then you will be editing *all* (enabled) Layers, and all Wavesamples of those Layers. An A appears in the Layer field, meaning all. Only Layers which are selected in the current Patch are affected. Therefore, in this Mode, using the Patch Selects can change what is being edited. (To see which layers are currently enabled on the EDIT page, double-click on the Instrument button.)

One important word of advice: **Always be aware of exactly what you are editing!** Because of the three different editing modes shown above, it is possible to accidentally modify an entire Layer when you wanted to edit only one Wavesample, or vice versa. If you have any doubt as to what is currently selected, press *Edit* to go to the EDIT page and verify (or change) what is showing there. Press *Edit* again, to return to the parameter page.

ABSOLUTE VS. RELATIVE VALUE CHANGES

When doing either type of multi-wavesample editing, the Up/Down Arrows will adjust each Wavesample *relative to its previous value.* On the contrary, if you use the Data Entry Slider, all Wavesamples will assume the *absolute value* shown in the display. In either case, pressing *Cancel•No* will return *all* Wavesamples to their previous value.

TUTORIAL:
UNDERSTANDING WAVESAMPLES, LAYERS, AND PATCHES

The best way to understand Wavesamples, Layers, and Patches is to actually work with them. Basic sampling is covered in pages 23 through 28 of the *Musician's Manual.* This tutorial assumes you know how to use the basic front panel controls on the EPS. If you have any doubts, refer back to the *Musician's Manual.* In the following procedures, a microphone is used as the sampling source. If you use a synthesizer, tape deck, or the output of a mixer as a source, the specific sounds will differ but the results will be similar.

CREATING LAYERS

First, let's make some Wavesamples. Press the *Sample* button. Pick a Sample Instrument by pressing one of the Instrument•Track buttons. You are now in Level-Detect Mode. If you are using a microphone, make sure you set INPUT LEVEL=MIC. Press *Enter•Yes* and say "one" into the microphone. Then immediately press *Cancel•No. You can also start and stop Sampling with the footswitch, if you prefer* (see page 21). Choose middle C as your root key. That's Wavesample number one, in Layer 1.

Press the *Sample* button again. Pick the same Sample Instrument. The display reads UNNAMED I LYR=1 WS=NEW. Use the Right or Left Arrow button to underline LYR=1. Use the Up Arrow button and change LYR=1 to LYR=N. The display now reads UNNAMED I LYR=N WS=NEW. The next Wavesamples you make will now occupy Layer 2. The N in LYR=N stands for new. Press the *Enter•Yes* button to lock this configuration in. Notice you are back in Level-Detect Mode. Press *Enter•Yes* and say "two." Press *Cancel•No.* Choose the same root key, middle C. That's Wavesample number two in Layer 2.

Press the *Sample* button. Pick the same Sample Instrument. Using the cursor, underline LAYER=2 and set it to LAYER=N. Press *Enter•Yes.* Now, you're in Level-Detect Mode. Press *Enter•Yes* and say "three." Choose the same root key. And that's Wavesample number three in Layer 3.

You should be able to hear Wavesamples, "one, two, and three" when you play middle C on the keyboard. You can repeat this process up to eight times, as there are eight possible Layers per Instrument. Instead of creating new Layers each time we sampled, we could have multisampled the same Layer, and spread the new Wavesamples across the keyboard. See below and page 26 in the *Musician's Manual* for more on multisampling.

PATCHES

Let's listen to our Wavesamples. If you used your voice as a source, you should hear "one, two, and three" when you play middle C. If you sampled a synthesizer, tape deck or mixer, you should still hear three different Wavesamples on middle C.

Press *Edit,* then "double-click" on *Instrument.* The screen reads 00 PATCH=123 - - - - -. Using the Right Arrow button, underline 2, then press the Down Arrow button. You have just turned Layer 2 off in this Patch. You should be hearing voice sample "one and three." Underline 3 in the display, and hit the Down Arrow button. Voice sample "three" is gone and only voice sample "one" remains.

Go to the Patch Select buttons near the Pitch and Mod Wheels and hold down the right Patch Select button. You will see an asterisk appear on the screen, signifying that button is down. While continuing to hold down the right Patch Select button, with your other hand (make sure #1 is underlined), press the Down Arrow button to turn Layer 1 off. Press the Right Arrow one time, and then press the Up Arrow button, to turn on Layer 2. Release the right Patch Select button. While holding down the left Patch Select button, underline 2, and turn it off. Keeping the left Patch Select button down, underline number 3 and turn it on.

When you play middle C, you will hear Wavesample "one" by itself. Press the right Patch Select button, play the same note, and you will hear Wavesample "two." Press the left Patch Select button, play the same note, and you will hear Wavesample "three." Hold down both buttons, and you will hear Wavesamples "one" and "two." These Patch Select buttons can be set to call up any combination of the eight Layers.

To free up both hands for playing, hold down the right Patch Select button. With your other hand, press the "active" Instrument•Track button, and right Patch Select configuration is locked in. Press the Instrument•Track button again to unlock the right Patch Select and return to the default Patch.

MULTISAMPLING INTO SEVERAL LAYERS

It's time for more sampling. Delete the Instrument by holding down the Instrument•Track button and pressing *Cancel•No.* Press the *Sample* button, then pick an Instrument. Press *Enter•Yes* and say "one." Press *Cancel•No* and set the root key to the lowest C on the Keyboard. Press the *Sample* button again and pick the same Sample Instrument. The display reads, UNNAMED I LYR=1 WS=NEW. The default here is NEW, meaning that a new Wavesample will be created in the same Layer of the Instrument. Press *Enter•Yes* to lock it in. You are in Level-Detect Mode. Press *Enter•Yes* and say "two." Press *Cancel•No.* Set the root key to C#, next to the first Wavesample. In Layer 1 you have Wavesamples "one" and "two," across the keyboard.

Press the *Sample* button again, then pick the same Sample Instrument. The display reads UNNAMED I LYR=1 WS=NEW. Underline LYR=1 in the display, use the Up Arrow button to set it to LYR=N. As you probably have guessed by now, your next Wavesample will be in a NEW Layer. Press *Enter•Yes.* Press *Enter•Yes* again and say "three." Make the lowest C note on the keyboard also the root key for sample "three." Press *Sample*, then pick the same Sample Instrument. Press *Enter•Yes.* Press *Enter•Yes* again and say "four." Press *Cancel•No.* Make your root key the lowest C#. When you play the C key, you will hear "one" and "three." On the C# key, you will hear "two" and "four."

Let's create Layer 3. Press the *Sample* button, then pick the same Sample Instrument. Underline LYR=2 and set it to LYR=N. The entire display now reads UNNAMED I LYR=N WS=NEW. Press *Enter•Yes*. Press *Enter•Yes* again and say "five." Press *Cancel•No*. Assign the root key to the location of the Lowest C note. When you play this note, you will hear samples "one, three, and five," although not in any particular order.

Press *Edit*, then *Instrument*. The display reads, 00 PATCH=123 - - - - -. Underline 2 in the display with the cursor, press the Down Arrow button, and turn 2 off. Underline 3, and turn it off. With both Patch Select buttons up, you are hearing samples "one" and "two" in Layer 1. Hold down the right Patch Select button, underline 1 in the display and turn it off. While keeping the right Patch Select button down, hit the Right Arrow button once. This underlines the location of 2. Press the Up Arrow button and turn 2 on. Now, hold down the left Patch Select button, and turn 2 off and 3 on. Hold down both Patch Select buttons, and turn all three Layers on, so the screen looks like this, * * PATCH=123 - - - - -.

Try the various combinations of the Patch Select buttons, and listen to the different samples called up by each variation. This exercise should give you a better idea of the relationship between Wavesamples, Layers and Patches.

VELOCITY AND LAYERS

Velocity can be used to call up Layers. Let's make a few more Wavesamples. Delete any existing Instruments, and let's start over. Press the *Sample* button, and pick a Sample Instrument. Now, we're back in the Level-Detect Mode. Press *Enter•Yes* and say "one," then press *Cancel•No* to stop sampling. Make middle C the root key. That's Layer #1. Press the *Sample* button again, pick the same Sample Instrument. The display reads UNNAMED I LYR=1 WS=NEW. Underline LYR=1, and set it to LYR=N. Press *Enter•Yes*. Press *Enter•Yes* again and say "two." Make middle C the same root key. That's Layer #2. Press the *Sample* button, then pick the same Sample Instrument. Underline LYR=2 in the display, and change it to LYR=N. Press *Enter•Yes* twice (unless you want to make an adjustment to the Level-Detect Mode), and say "three." That's Layer #3. When you play middle C, you will hear samples, "one, two, and three," in Layers 1, 2, and 3.

Now that we have our Wavesamples, let's get Velocity in the act...
Press *Edit*. This takes us to that "all important" EDIT Page. Using the Data Entry Slider or Arrow buttons, adjust the page so the screen reads, UNNAMED I LYR=1 WS=ALL. Press the *Layer* button. This will take you to the EDIT/Layer Page. Scroll to the LYR VEL Page and underline and adjust this Parameter so it reads LYR VEL LO=0 HI=42. Press the *Edit* button again, which takes you back to the EDIT Page. Underline LYR=1 in the display and change it to LYR=2. The complete display reads UNNAMED I LYR=2 WS=ALL. Pressing the *Edit* button takes you back to the EDIT/Layer Page (the *Edit* button acts as a toggle). Set the EDIT/Layer Parameters to LYR VEL LO=42 HI=85. Press the *Edit* button again, to toggle to the EDIT Page. Underline LYR=2 and set it to LYR=3. Press the *Edit* button to toggle back to the EDIT/Layer Page. Set these Parameters to LYR VEL LO=86 HI=127.

All three Layers are now set to respond to Velocity. A Layer will only play when the velocity is within the range specified on this page. A soft attack will call up sample "one," a medium attack, sample "two," and a fast attack, sample "three." Remember, you can do this with up to eight Layers.

CROSSFADE BREAKPOINTS

Using the Crossfade Breakpoints on the EDIT/Amp Page, you can customize how the volume modulator (also selected on the EDIT/Amp Page) will affect the volume of the Wavesample. This lets you use velocity, keyboard position, pressure or any other modulator to crossfade between Wavesamples. Note that whenever you crossfade between Wavesamples, the Wavesamples must be in different Layers, since only one Wavesample can occupy a given key within a single Layer.

KEYBOARD CROSSFADE

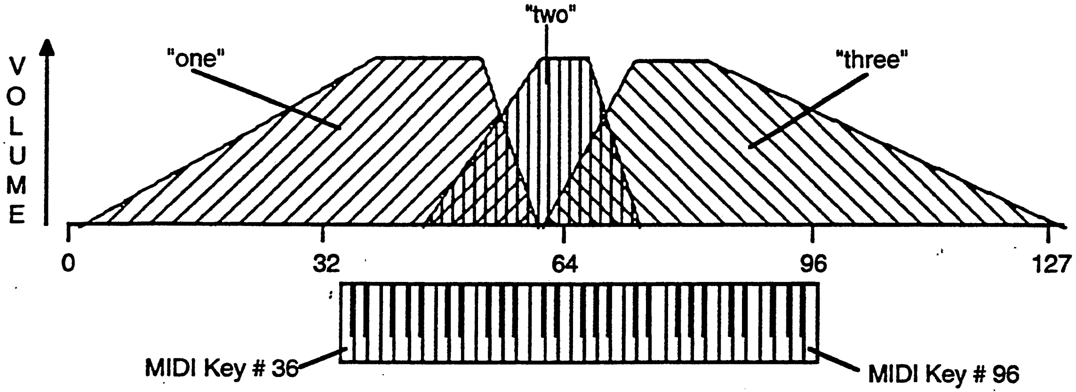
We'll start with a keyboard crossfade. First, create three samples in three Layers:

- Press *Sample*, then pick a Sample Instrument. Press *Enter•Yes* and say "one," then press *Cancel•No* to stop sampling. Make the lowest C on the keyboard the root key for sample "one" in Layer 1.
- The next sample will be in a NEW Layer. Press *Sample*, then pick the same Sample Instrument. Underline LYR=1 and change that to LYR=N. Press *Enter•Yes* twice (unless you want to make adjustments to the Level-Detect Mode). Say "two." Press *Cancel•No* and assign the root key to middle C (two octaves above the lowest C). That's sample "two" in Layer 2.
- Press *Sample*, then pick the same Sample Instrument. Underline LYR=2 and change that to LYR=N. Press *Enter•Yes* twice, and say, "three" into the microphone. Press *Cancel•No* and assign the root key to the C two octaves above middle C. Sample "one" is in the bottom third of the keyboard. Sample "two" is in the middle third. And, Sample "three" is in the top third.

Press the *Edit* button which takes you to the EDIT Page. Adjust the parameters in the display so they read UNNAMED I LYR=1 WS=ALL. Press the *Amp* button, which is also identified as button #6. You are now on the EDIT/Amp Page. Scroll right to VOLUME MOD and adjust the parameters so the display reads VOLUME MOD=KBD * 0. This selects KBD (keyboard) as the volume modulator. Underline the number in the display and change it to 99. The display will read VOLUME MOD=KBD * 99. Scroll right to A-B FADE IN and set the parameters in the display to read, A-B FADE IN=0 40. Scroll right one more page, and set the parameters in the display to read, C-D FADEOUT=50 60. Press the *Edit* button to return to the EDIT Page. Underline LYR=1 in the display and change that to LYR=2. The display now reads UNNAMED I LYR=2 WS=ALL.

Press the *Edit* button to toggle to the EDIT/Amp Page. Scroll right to the VOLUME MOD Page, and set it to VOLUME MOD=KBD * 99. Scroll right to the A-B FADE IN Page and set it to A-B FADE IN =45 55. Scroll right to the C-D FADE OUT Page and set it to C-D FADE OUT=65 75.

Press the *Edit* button and set the parameters in the display to read UNNAMED I LYR=3 WS=ALL. Press the *Edit* button again to toggle to the EDIT/Amp Page. Scroll right to VOLUME MOD, and set it to VOLUME MOD=KBD * 99. Scroll right to A-B FADE IN and set the parameters to A-B FADE IN=60 70. Scroll to C-D FADE OUT and set it to C-D FADE OUT=80 127. The following figure illustrates the keyboard crossfade that you have now constructed:

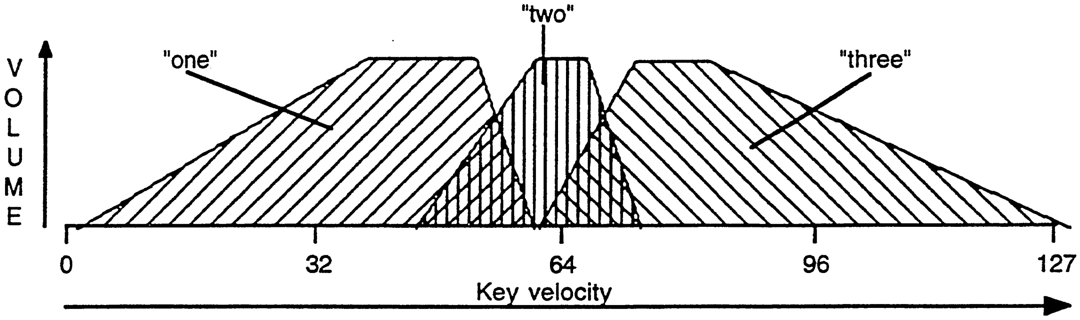


As you play chromatically up the keyboard you will hear the three different Wavesamples fading in and out. The voice samples could have been piano or synthesizer samples, and the result would have been the same. The keyboard was used as the Volume Modulator, and the Crossfade Breakpoint parameters enabled you to blend the samples together seamlessly.

Note that when the keyboard is used in this way, the numbers selected for A, B, C and D refer to MIDI key numbers. The low C on the EPS keyboard is MIDI key # 36; the high C is MIDI key number 96. Middle C is MIDI key # 60. And so on. (The keys of an 88-note piano-style keyboard go from MIDI key 21 to MIDI key 108.)

VELOCITY CROSSFADE

Now, we'd like to change our keyboard cross fade to a velocity cross fade. (Earlier we did a velocity switch at the layer level; now we will do a similar thing at the wavesample level.) To do this, we'll have to change the volume modulator from KBD to VEL in each wavesample. We could change them one at a time by selecting different layers on the EDIT Page. An easier way to change the values of *all* of the wavesamples is to go to the EDIT Page and scroll left to underline the Instrument name. When you do this, the display reads UNNAMED I LYR=A WS=ALL. This means that you will be editing *all* of the wavesamples in *all* of the enabled layers. Double-click on the *Instrument* button to make sure layers 1, 2, and 3 are enabled. Now press the *Amp* button and scroll to the VOLUME MOD Page. Remember, when you are editing more than one wavesample, the Data Entry Slider changes all values *absolutely* to the displayed value, while the Up/Down Arrow buttons change each value *relative* to its previous value. In this case, we want to change all of the values to be VEL, so use the Slider until the display reads VOLUME MOD=VEL * 99. Now you have the same cross fade as before except that velocity, rather than keyboard location, is the modulator that's doing the cross fade.



Now when you play softly, you will hear wavesample 1, play a little harder and you will hear 2, and play very hard and you should hear 3. However, we have the modulator fading out at high velocity (see illustration above), so you will not hear wavesample 3 with maximum velocity. We have to adjust the cross fade breakpoints for this particular wavesample. Press *Edit*, underline LYR= and set it to 3. Press *Amp*, scroll to C-D FADEOUT and set C to 127. There will now be no velocity fade out for layer 3.

CHANGING THE ROOT KEY

Now, it is time to set all the root keys to middle C. Press the *Edit* button, and set the display to read UNNAMED I LYR=I WS=ALL. Go to the EDIT/Pitch Page by pressing *Edit* then *Pitch*. Using the Up/Down Arrow buttons, set the display to read ROOT KEY=C4 FINE=+0. This changes the root key of the first sample from C2 to C4. Press *Edit* (you're back on the EDIT Page) and set the display to read UNNAMED I LYR=2 WS=ALL. Go back to the Pitch Page by pressing the *Pitch* button, and make sure the display reads ROOT KEY=C4 FINE=+0. Press the *Edit* button one more time and set the display to read UNNAMED I LYR=3 WS=ALL. Press the *Pitch* button and set the display to read ROOT KEY=C4 FINE=+0. Now when you play middle C, you will hear the three samples at the proper pitch as they respond to velocity.

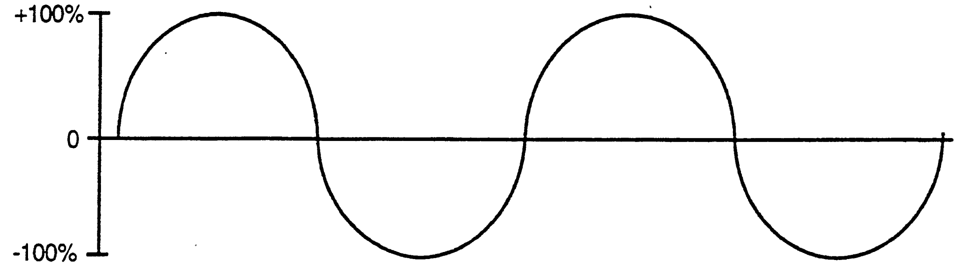
WAVESAMPLE PAN

Now for some more fun... Go back to the EDIT Page by pressing *Edit*. Set the display so it reads, UNNAMED I LYR=1 WS=ALL. Press the *Amp* button and scroll right until you get to PAN. Using the Up/Down Arrow buttons, make sure the asterisk is in the middle of the Pan field: PAN= - - - - * - - -. Go back to the EDIT Page by pressing *Edit*.. Select Layer 2 to work on by underlining LYR=1 and changing it to LYR=2. Press the *Amp* button and assign Layer 2 to the left side of the stereo field. The display will look like this PAN= * - - - - - - -. Press *Edit* and select Layer 3 by underlining LYR=2 in the display and change it to LYR=3. Press the *Amp* button and set the asterisk to the right side of the stereo field: PAN= - - - - - - - *. Depending on the velocity you use when you strike the key, you should be able to hear either sample "one" in the center of the stereo field; sample "two" in the left; sample "three" in the right of the field. (Note that if you have the EPS connected in mono, this exercise will have no effect at all.)

TUTORIAL: WHAT IS SAMPLING?

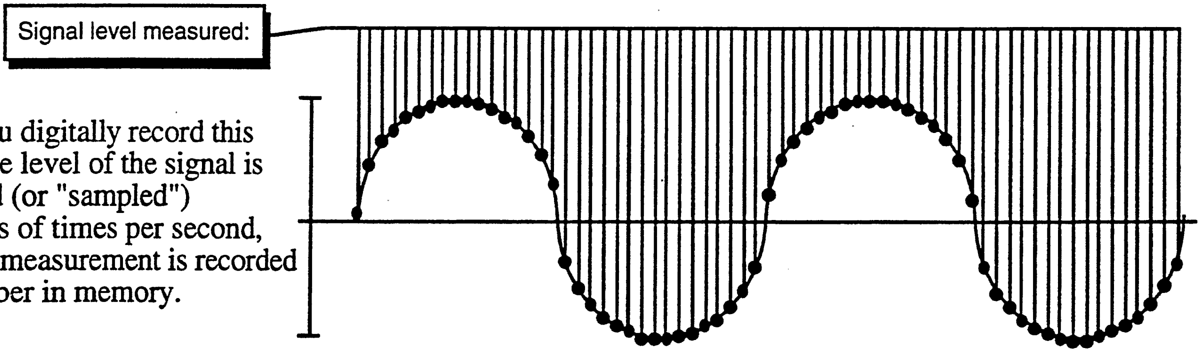
Let's begin with a simple explanation of what sound is. A sound begins as a series of vibrations, or pressure waves, in the air. When these vibrations reach the diaphragm of a microphone, they cause it to move back and forth. This creates a fluctuating electrical signal which rises and falls around a center, or zero line.

A simple sound wave, once it has been converted into an electrical signal, might look like this:



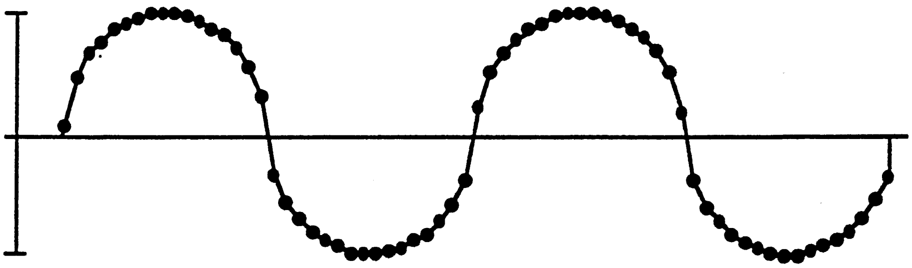
A conventional analog tape recorder would record this signal by converting the electrical fluctuations into magnetic fluctuations and then imprinting a continuous (or "analog") copy onto the magnetic surface of the tape. A digital sampling system, such as the EPS or a digital tape recorder, works a little differently:

When you digitally record this sound, the level of the signal is measured (or "sampled") thousands of times per second, and each measurement is recorded as a number in memory.



The digital sampler does not record the actual sound but rather a series of discrete numbers, each of which represents the level of the signal at a given instant in time.

On playback, the EPS reconstructs the original signal by "connecting the dots," producing an output voltage which corresponds to the numbers recorded in its memory. This voltage can then be amplified and sent to speakers, which turn it back into pressure waves in the air so that we can hear it.



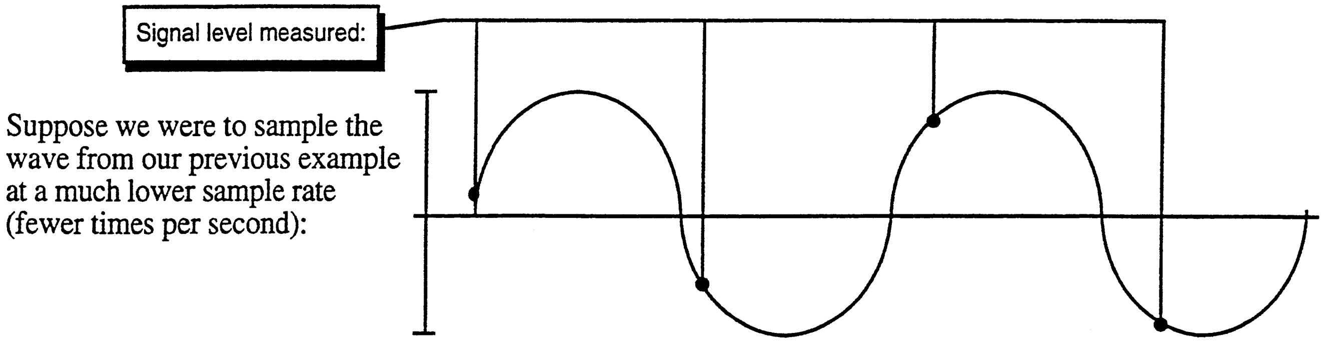
SAMPLE RATE

The sample rate determines how often the signal is measured (that is, how close together the dots would be in the illustration above). A sample rate of 30 KHz, for example, means that we are sampling the signal 30,000 times each second. A higher sample rate will yield a more accurate picture of the waveform and better high frequency response. But bear in mind that a higher sample rate will also use up the EPS memory more quickly, since you are generating more numbers per second that have to be stored in that memory.

The EPS can sample at any of 40 different sample rates, from 6.25 KHz (6,250 samples per second) to 52.1 KHz (52,100 samples per second). To give you some frame of reference, Compact Discs are recorded at 44.1 KHz, Digital Audio Tape (DAT) at 48 KHz. You can adjust the EPS sample rate by scrolling one step to the right after entering sample mode (see page 24 in the *Musician's Manual*).

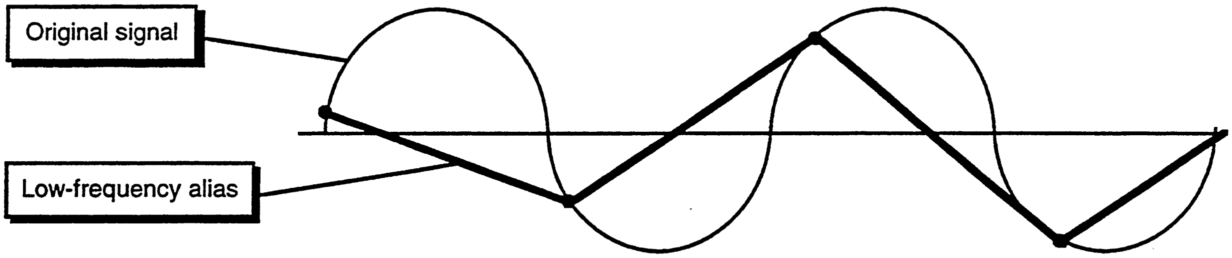
ALIASING

A digital sampler can only accurately record frequencies up to one half that of the sample rate. This frequency (half the sample rate) is known as the **Nyquist frequency**, after the fellow who figured that out. Trying to sample sounds which contain frequencies above half the sample rate will result in **aliasing**, the creation of false (or "alias") low-frequency tones, when playing the sound back.



Suppose we were to sample the wave from our previous example at a much lower sample rate (fewer times per second):

When the EPS tries to reproduce this sound (to connect the dots, as it were) the resulting wave bears little resemblance to the original, because there are not enough sample points to accurately recreate it:



To prevent aliasing, the EPS has a variable input (or "anti-aliasing") filter which removes frequencies above a cutoff point before the signal reaches the sampling circuitry. Whenever you change the sample rate, the EPS automatically adjusts its input filter to the highest suitable cutoff frequency for that rate. You can, however, change it manually if you want a higher or lower setting. (From the sample rate parameter, scroll right to select FILTER CUTOFF =###.)

GETTING READY TO SAMPLE

Here are a few things you can do before actually sampling anything which will result in your getting better quality samples.

- **Start with the cleanest possible signal.** This may seem obvious, but a sample (or any recording) can only be as good as the original signal, so you should pay attention to the signal path. For example, if you are feeding the audio input of the EPS from a mixer, using a direct out from the individual channel is better than using an auxiliary send because there are fewer preamps (and thus less noise) in the chain. If you do use an auxiliary or a main send, make sure only the channel(s) you intend to sample are turned up in that send.

- **Record the sound on tape and sample from the tape.** This not always possible, but it tends to yield better results because now the sound is repeatable. This is important when adjusting the input level—before sampling you can play the sound as many times as necessary, watching the meter and adjusting the level of the signal into the EPS, until you have just the right level—high enough to get the best possible dynamic range, yet low enough to avoid clipping. The other good reason for sampling from tape also has to do with repeatability. Suppose you are sampling a horn section live, directly into the EPS, and suddenly they play that one excruciatingly perfect note that you've been waiting for all your life. But after making the sample you discover that the input level was a little too high and the sample is clipped. Or you want to put a slightly different EQ on it, or maybe some reverb. Unfortunately, you will never get them to play that note just the same way again, so the moment is lost. If you had it on tape you could simply make your adjustments and sample it again.

SETTING THE INPUT LEVEL

As mentioned previously, optimizing the input level is crucial in sampling. Record at too low a level and you don't utilize all the bits of resolution that are available in the system—the sample will be too quiet and overly noisy. Record at too high a level and you will introduce clipping, which tends to be extremely harsh and unpleasant. For the sake of this and the examples that follow, we will assume that you are using an input signal from a repeatable source, such as a tape player, record, CD or synthesizer, whose level you can adjust. First:

- Connect the signal source to the audio input of the EPS using a standard 1/4" cable.
- Press *Sample*, whereupon the EPS will enter VU (level-detect) mode.

Now, to set the input level:

- Play the signal into the EPS. Watch the Display to see if the AMP indicator lights (this light indicates overload, or clipping). If it does light, turn the signal down a bit. If the AMP indicator does not light when you play the sound, turn the signal up a little. Now play the sound into the EPS again, watching the indicator and adjusting the signal accordingly.

- Repeat this until you have found the point just barely *below* where the AMP indicator lights. This is the optimum recording level. With a little practice you can quickly get a good level every time.

SAMPLING THRESHOLD AND PRE TRIGGER

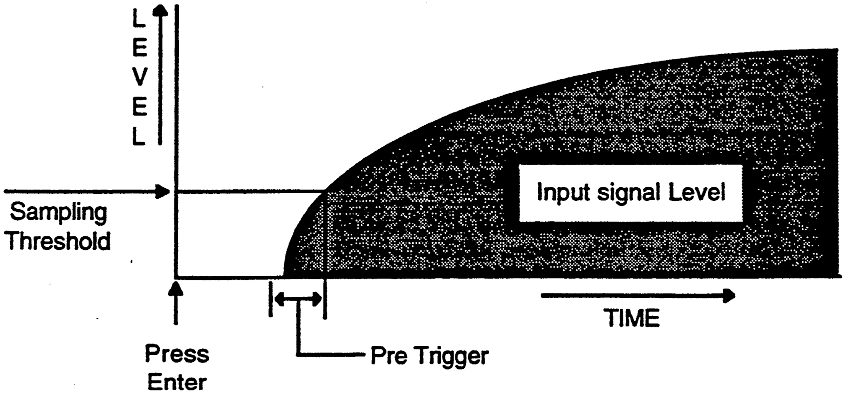
The **Sampling Threshold** provides a way to make the EPS "wait" until the signal reaches a certain level before it begins to record. The sampling threshold is represented by a *star* on the level-detect screen when sampling (see page 23 in the *Musician's Manual*). Pressing the Up Arrow button raises the threshold; pressing the Down Arrow button lowers it.

When the sampling Threshold is set to minimum (the star all the way to the left of the Display) the EPS will begin sampling as soon as you hit *Enter•Yes*. The higher (further to the right) you set the threshold, the higher the input signal will have to be before the EPS begins recording. By adjusting the threshold, you can avoid recording a lot of empty space (silence) at the beginning of your sample.

The problem with using a high sampling threshold is that you can sometimes chop off low-level information at the beginning of the sound (below the threshold), making it sound clipped and unnatural. That's where the **Pre Trigger** parameter comes in.

The EPS initially records the sample into a "buffer memory" of up to 127 milliseconds (a little over one tenth of a second). You determine the length of this buffer with the pre trigger amount, found by scrolling three steps to the right from the level-detect screen. Now when you press *Enter•Yes*, you get the benefits of a higher threshold without chopping off the beginning of the sound.

After the Sampling Threshold is reached, the EPS will "back up" the Sample Start by the amount of time selected in the Pre Trigger parameter. Sound below the threshold level (which would otherwise be lost) is retained.



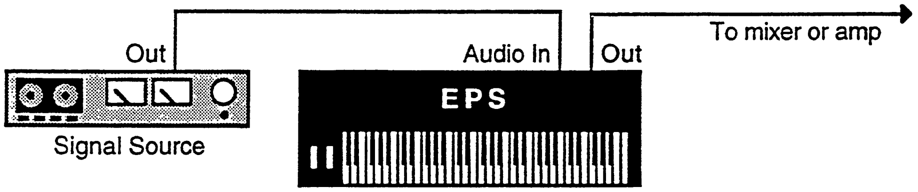
A pre-trigger amount of 10 to 20 ms should be adequate in most cases. You could set it higher to ensure that you don't miss any of the sound, or when using a very high sample threshold. In any case, a little silence in front of the sound is better than clipping it short, because you can later move the sample start forward to eliminate the dead space, and then truncate the wavesample.

USING EQUALIZATION

Probably the single most valuable tool for shaping a sampled sound is a good equalizer. Best for this purpose is a parametric EQ which allows precise control over center frequency and bandwidth, but excellent results can be obtained with a 10- or 27-band graphic EQ, or even with the channel EQ on a mixing console.

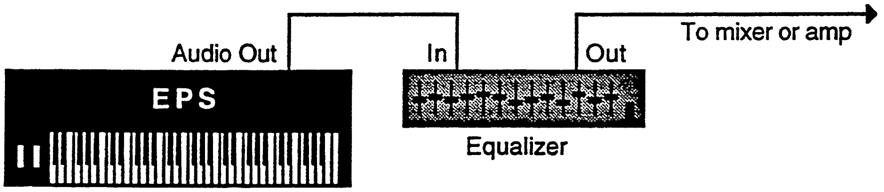
Often a sound contains some overtones or harmonics which sound normal on one note but unnatural when transposed over a range on the keyboard. Or it might be necessary, when trying to match up the different samples in a multisampled sound, to apply some drastic EQ to one or more of those samples. The answer is to equalize the signal on the way into the EPS. Here's a little trick for finding the proper EQ settings (again, we assume a repeatable signal source such as a tape, CD or synthesizer):

First, sample the sound flat, without any EQ or other processing.



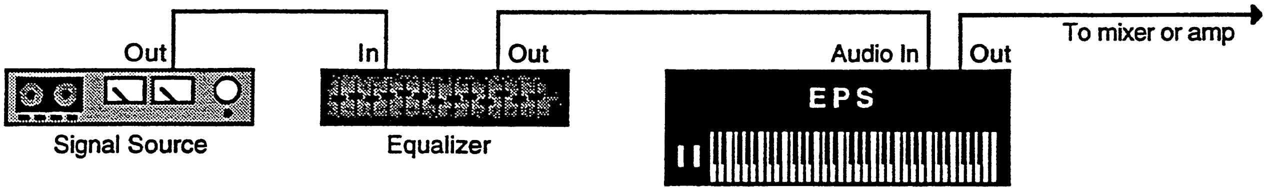
Play the sample on various notes, listening to the overall tonal balance — does it need some added highs, or perhaps a little less midrange, etc. Listen particularly for frequencies which seem to stand out unnaturally when the sound is transposed.

Now connect the equalizer across the audio output of the EPS.



Play the EPS at the root key of the new sample (it's very important that you play the root key during this process so that you'll be equalizing exactly the pitch you sampled). While playing the root key, adjust the equalizer, zeroing in on the problem areas and cutting or boosting those frequencies, until the sample sounds just the way you want it to.

Next, *without changing any of the settings on the equalizer*, re-patch so that the equalizer is between the signal source and the EPS Audio In:



Sample the sound again (you will probably need to re-adjust the input level first). The EQ curve you set up in the previous step is now "built into" the sample, and it should sound just as it did when you were playing it through the equalizer. If you find that you have boosted or cut any given frequency too much, just change the EQ settings slightly and sample the sound again. With a little practice you will be able to quickly identify problem frequencies and EQ them out using this method.

OTHER EFFECTS

The technique shown above can be used in some cases with signal processors other than equalizers. In place of the EQ in the above example you could substitute a delay, reverb, harmonizer, exciter or virtually any other effect, and follow the same procedure. Just remember that the effect will transpose along with the note—delay times will speed up and slow down depending on the note played, etc.

- Sample the sound dry;
- Play the EPS through the effect(s) until you get the desired sound; then
- Sample the sound again through the effect(s).

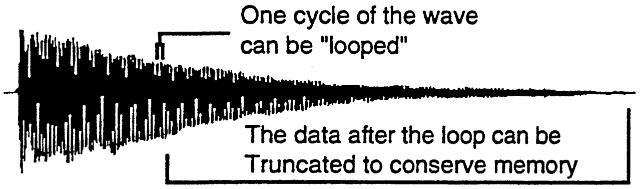
LOOPING

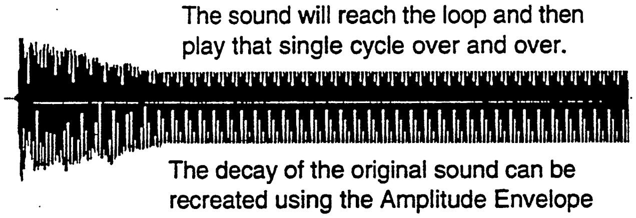
One of the fundamental challenges of sampling is to make efficient use of the sampler's memory. You simply cannot sample the entire duration of every event. Plus, you usually want a sound to continue playing as long as you're holding the key down, regardless of how long the original event was. This is why we employ **Looping.**

When we loop a segment of sound, what we are doing is playing through to the end of the looped segment and then instantly starting back at the beginning of the loop, as if playing one continuous sound. It's a lot like a tape loop—a segment of recording tape with the two ends spliced together so that it cycles repeatedly.

Consider that a low note on a grand piano can last 30 seconds or more from the time the key is struck to the time it decays into silence. Sampling this entire event does not make sense because:

- You could use up all your sampling memory (and then some) on one note, leaving no memory for multisampling; and
- After the initial attack transients die down, the sound of the piano string settles into what is essentially a repeating waveform. This means that you can select one cycle of this repeating waveform and *loop* it (play it over and over). All the data after the loop can then be removed (truncated) because you don't need it. This conserves memory.




The sound will reach the loop and then
play that single cycle over and over.
The decay of the original sound can be
recreated using the Amplitude Envelope

A piano, solo violin, guitar or woodwind are all sounds which you could loop in this way. However, there are other sounds which do not settle into a repeating waveform. A full pipe organ, string section or a choir would be good examples of such sounds. These sounds remain extremely complex throughout their duration. Using a single-cycle loop on a choir sample would cause the sound to suddenly become very static and one dimensional when it reaches the looped section. These complex, ever-changing sounds require that we employ longer loops—repeating a large segment of the sound rather than just a single wavecycle.

Generally, successful loops fall into one of two categories—single-cycle loops, which we refer to as **Short Loops,** and loops of about a second or more, which we call **Long Loops.** Which type to use depends on the sound. If the sound settles into something relatively static, use a short loop. If the sound is composed of many elements which constantly chorus and interact with each other over time, you will need to use a long loop.

AUTO-LOOP FINDING

When you loop a sample, it is important that the beginning and end of the loop "match up" to form a continuous waveshape—otherwise the loop will pop or click each time it reaches the splice point. For this reason, the best loop points are those which occur where the wave crosses the zero line (called a "zero crossing") and where the direction of the wave at the loop start matches that at the loop end.

The EPS has a System parameter called **Auto-loop Finding** which, when On, allows you to choose only loop start and loop end points which meet these criteria.

Press *Edit*, then *System*, and scroll until the display shows AUTO-LOOP FINDING = ##. Make sure it is set to On. Now, whenever you move the loop start of any Wavesample, the EPS will automatically jump to the next zero crossing which matches the wave direction at the loop end, and vice versa. This does not, in itself, guarantee a good loop but it will save you lots of time and trouble by ruling out all those splice points which definitely *won't* work.

SHORT (SINGLE-CYCLE) LOOPS

As we discussed previously, a short (single-cycle) loop is appropriate when the sustain portion of the sound is a more-or-less repeating wave. The best way to find out if a short loop is right for a given sound is to try it and see if it works. (If fact, the best way to learn about looping generally is to experiment with moving both the loop start and the loop end around in a Wavesample and listening to the results.)

There is a simple technique for finding a short loop. For this example we will sample some sound with a simple sustain, such as a clean guitar or bass sound, or a synth patch without a lot of chorusing.

First press *Edit*, then *System* and make sure AUTO-LOOP FINDING=ON.

Next connect the signal source to the EPS Audio In, set the input level, and sample the sound. After you have played the root key to conclude the sampling process, the EPS puts you on the EDIT/Wave Page which, happily, is just where you want to be in order to turn the loop on.

- Press the Up Arrow button twice to select MODE=LOOP FORWARD. Now hold down a key and listen to the sound. The default settings for a new Wavesample are LOOPSTART=00%, LOOPEND=99%, meaning that the whole sample is currently looping over and over.

- Scroll right to the loop start parameter, underlining the coarse adjust (the number to the right, in parentheses). Use the Data Entry Slider to move the loop start up, past the beginning of the sound. Try a setting of (25) to start. This puts the loop start 25% of the way into the Wavesample. Play the sound and listen.

- Scroll right to the loop end parameter, again underlining the coarse adjust (the number in parentheses) which should be at (99). Use the Data Entry Slider to move the loop end down as far as it can go. It will stop at (25) or wherever you set the loop start to, because you cannot adjust the loop end past the loop start. The loop start and loop end are now at the same place in the Wavesample. Play the sound. When it hits the loop, it will go supersonic because the EPS is trying to loop on just one sample.

- Scroll two steps to the left to select the loop end fine adjust (the number just after LOOPEND=). Press the Up Arrow button once and play the sound. The pitch of the loop should be a little lower —you have moved the loop end away from the loop start to the first potentially good splice point.

- Press the Up Arrow button again and listen to the sound. With each press of the Up Arrow button, the pitch of the loop should go down as the EPS moves the loop end to the next zero crossing. Keep hitting the Up Arrow button, one press at a time, until the loop sustains at the same pitch as the sound before the loop. This is a single-cycle loop.

- After you've found a good loop, you should move the sample end back to the same point as the loop end, then **Truncate** the Wavesample to reclaim the memory the loop which is no longer needed. (TRUNCATE WAVESAMPLE is found on the COMMAND/Wave Page.)

ADJUSTING LOOP POSITION

Prior to truncating the Wavesample, you may decide that the loop occurs too early in the sound (before all the attack transients have died down) or too late (wasting memory). The EPS has a way to move the whole loop (start and end) around while keeping its relative length intact.

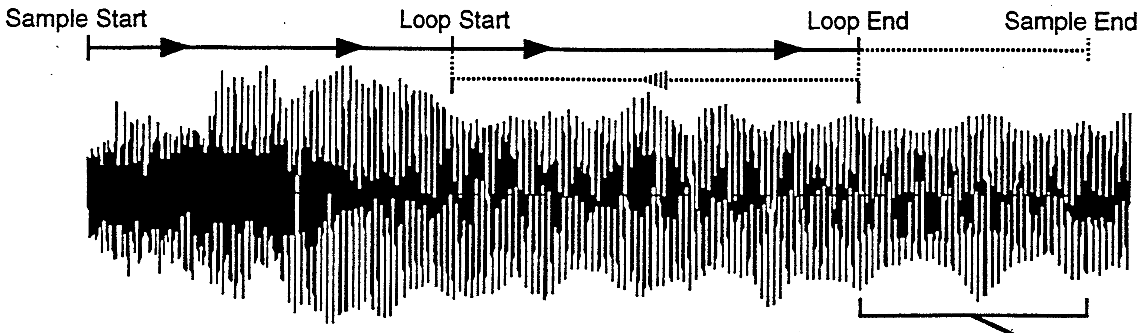
- While still on the EDIT/Wave Page (press *Edit*, then *Wave* if you are not) scroll until the display shows LOOPPOS= ## (##). This is the loop position parameter. The number shown here is that of the loop start, but adjusting this parameter will move both loop start and loop end together, leaving the length (and thus the pitch) of the loop unaffected.

- Underline the loop position coarse adjust (the number in parentheses) and try moving the loop position around while listening to the sound. Find the place where the loop works most naturally with the rest of the sound. Note that you might have to readjust the loop end slightly after moving the loop position, particularly if the sound has pitch variations in it.

- Again, once you've found a loop you like, move the sample end back to the loop end, and truncate the Wavesample.

LONG LOOPS

If a single-cycle loop doesn't work for a particular sound, try a longer loop. The idea is the same—a segment of the sound is repeated again and again—but the long loop encompasses many cycles of the sound. Long Loops retain the tonal complexity and sense of "movement" in the original sound, and will therefore work better for sounds like vocals, strings, flutes, stacked synth sounds, etc.



Once it reaches the Loop End the EPS returns instantly to the Loop Start and plays the loop segment over and over until the key is released

Data after the Loop End can be Truncated to conserve memory

There is no one simple procedure for getting a perfect long loop every time—it all depends on the sound. Some sounds are easy to loop; other sounds seem to defy all attempts to find a good loop. Especially difficult to loop are those sounds whose timbre and volume change radically over time. You'll find, however, that the EPS provides a wide variety of tools for getting the best possible results with even the most difficult sounds. By following the guidelines below (and not being afraid to experiment) you should be able to get an acceptable loop on virtually any sample.

- The auto-loop finding parameter should be on when looking for a long loop.

- Sample a sound, play the root key, and set the loop mode to MODE=LOOP FORWARD.

- Scroll to the loop start parameter, underlining the coarse adjust (in parentheses), and move the loop start forward past the initial attack of the sound. Try starting with a value somewhere between 15 and 40 percent. Hold down a key and listen to the loop.

- Scroll to the loop end parameter, again underlining the coarse adjust. While holding down a key, use the Data Entry Slider to move the loop end back towards the loop start. The closer to the loop start it gets (that is, the shorter the loop) the more noticeable the loop will sound. The idea is to find the shortest possible loop (to conserve memory) which doesn't sound obviously "looped."

- While holding down a key you can scroll back and forth between the loop start and loop end, changing the coarse and fine adjust for each, listening to how different parts of the sound loop.

- Most often you will find a loop which works fairly well except that the splice point is noticeable. In this case, try performing one (or more) of the cross-fades contained on the COMMAND/Wave Page. Cross-fading can smooth out the timbral differences between loop Start and loop end, making the transition less abrupt. See pages 31-33 for more details.

- A loud bump or "pop" at the splice point usually indicates a volume difference between loop start and loop end. Try VOLUME SMOOTHING the loop (see page 36) before doing a cross-fade.

- Again, once you have a good loop, move the sample end back and then truncate the Wavesample.

COMMAND/System Page

To execute the following commands, first press *Command*, then *System.* You can then select the individual commands using the Arrow buttons.

0) LOAD MIRAGE-DSK SOUND

PURPOSE: See Page 19 in the *Musician's Manual.*

CONVERTING MIRAGE SOUNDS TO EPS SOUNDS

In the Mirage, the memory is divided into two 64 Kbyte sections, Lower and Upper. Within each section there are eight Wavesamples. The EPS converts the Mirage memory into two Wavesamples: Wavesamples 1 and 17. All Lower data is contained in WS #1. All Upper data is contained in WS #17. All other Wavesamples are copies of these two (they do not contain their own data). The WAVESAMPLE INFORMATION command will verify this. Two layers are created, 1 and 2, to simulate the Mirage voice, which has two oscillators layered together. In some Mirage sounds, layer 2 is inaudible and may be deleted without affecting the sound. Some other points to remember—

- Wavesamples which do not appear in the keymap are created anyway. Sometimes these are alternate samples used in the Mirage's program variations. Sometimes these are useless and may be deleted.
- The EPS defaults to converting Mirage program #1. Other programs may be converted by scrolling right to the parameter PROGRAM= in the command before pressing *Enter.*
- Most Mirage sounds use all 64 K of memory. For those sounds which don't, truncating will make the sound smaller. The EPS will not truncate a Wavesample if there are copies which use the same wavedata. *You most move the sample start and end of all the copies, or delete the copies, then truncate.*

1) SET NUMBER OF VOICES

PURPOSE: To determine the playback mode of the EPS. Using 20 voices the EPS has a 31.2 kHz playback rate for a 15 kHz frequency response; at 16 voices the EPS has a 39 kHz playback rate for a 19 kHz frequency response; at 12 voices the EPS has a 52 kHz playback rate for a 20 kHz frequency response. The default is 20 voices.

- Select NUMBER OF VOICES=20/16/12.
- Press *Enter•Yes.*

2) FORMAT FLOPPY DISK
3) COPY OS TO DISK

PURPOSE: See Page 22 of the *Musician's Manual.*

4) SAVE GLOBAL PARAMETERS

PURPOSE: Global parameters are those on the EDIT/System, EDIT/MIDI, and Sample Pages. These parameters are global to the EPS and are not saved with the Instruments, sequences, or banks. For instance, if you normally sample from a mic input, it would be convenient for you to save that setting to disk as a global parameter, that way when you boot up, the EPS will always be ready to sample a mic input signal, and not a line signal. Another example is keyboard touch. If you have a firm playing style, for instance, it would be convenient to set the EPS to always respond to your particular playing style. You would set TOUCH=FIRM 1 on the EDIT/System Page, then save that to disk as a global parameter along with the current operating system.

- Select SAVE GLOBAL PARAMETERS. Make sure you have a formatted disk with the most recent operating system in the disk drive.
- Press *Enter•Yes.* The display reads DISK COMMAND COMPLETED.

5) LOAD GLOBAL PARAMETERS

PURPOSE: To load global parameters from disk, without having to reboot the EPS.

- Select LOAD GLOBAL PARAMETERS. Make sure you have the disk containing the global parameters and operating system loaded into the disk drive.
- Press *Enter•Yes*. The display reads DISK COMMAND COMPLETED.

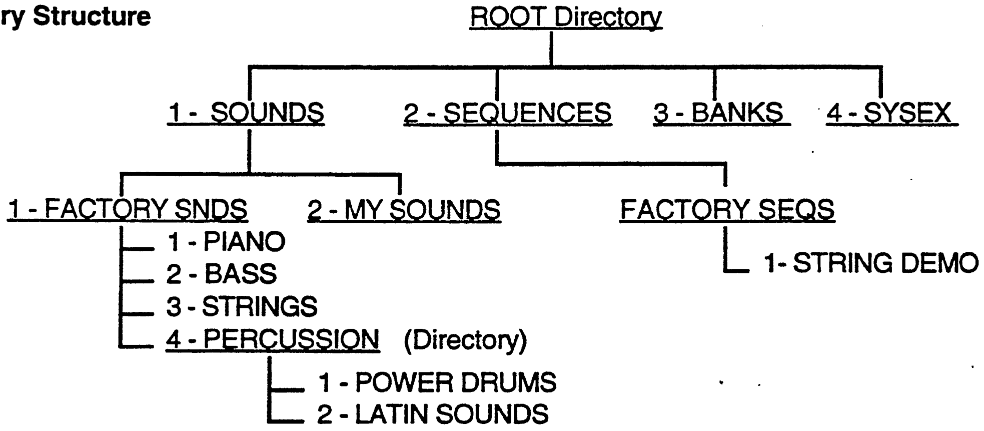
6) CREATE DIRECTORY

PURPOSE: To create a new directory on the current disk. Directories are not generally necessary when working with floppy disks, as it is unlikely that you will fit more than 38 files on a floppy. However, a hard disk (which can be used with the optional SCSI Interface), can hold hundreds of files and directories are a necessary part of managing and organizing those files.

A directory is a group of up to thirty-eight (38) files. These files can be any combination of file types. One of the possible file types is another directory, so you can create a directory within a directory (called a sub-directory). If you do not create any sub-directories, you will be limited to the thirty-eight files of the Root (or Main) directory. The Root directory is the default top level directory selected when you change storage devices or boot up. If you save a sound without selecting a sub-directory first, it will be saved in the Root directory. If you are familiar with the Macintosh®, sub-directories are similar to folders.

As explained above, the EPS will only allow you to scroll through a list of up to thirty-eight files at any one time without changing directories. However, any one (or more) of these files may be a directory, which may contain up to thirty-eight more files. Every time you create a directory, you are making space for thirty-eight more files on your disk. You eventually create a tree-like structure with the root directory as the trunk, and the various levels of sub-directories conceptually similar to the branches of the tree. For example:

Sample Directory Structure



In this example, files 1,2, and 3 in the FACTORY SNDS directory are EPS Instrument files which would be displayed by pressing *Load*, then *Instrument*. File 4 is a Directory "file" displayed by pressing *Load*, then *System*. If you press *Enter•Yes* while this Directory is displayed, you will enter the directory and will no longer be able to see PIANO or BASS when you press the *Instrument* button; instead, you will see POWER DRUMS and LATIN SOUNDS. This means that the directory named PERCUSSION is currently selected and you are viewing the files it contains. There are a number of EPS operations and commands for creating directories and moving up and down through the directory structure which you will need to use.

To Create a Directory:

- Press *Command,* then *System,* and scroll to the CREATE DIRECTORY command.
- Press *Enter•Yes.* The display shows DIRNAME = NEWDIRECTORY. You may edit the name of the directory to be created by using the Data Entry slider and the Arrow buttons. The name you choose should in some way reflect the files which will be contained in the directory.
- Once you have chosen a name, pressing *Enter•Yes* will create a new directory in the current directory. The display will show DISK COMMAND COMPLETED.

To Enter or move Down into a Directory:

- Press *Load,* then *System.* Use the Up/Down Arrow buttons to find the name of the new directory you wish to enter.
- Press *Enter•Yes.* This will select the new directory and allow you to view the contents of the selected directory.
- The display will show EXIT TO <dir name> where "dir name" is the name of the parent directory which you came down from.

Pressing the right or left arrow keys when this EXIT TO <dir name> directory entry (which is actually file 0 in the directory) is displayed will show you the name of the current directory where you are located.

Note!

Once you have entered a directory from the LOAD/System Page, you will not see any file names (except Macro Files) until you press one of the Page select buttons, *Instrument*, *Seq•Song*, or *MIDI.* Remember to select the file type you are looking for before concluding that you have not found the correct directory.

To Exit from or move back Up from a Directory:

- Press *Load*, then *System.* Use the Up/Down Arrow buttons until the EPS displays EXIT TO <dir name> (where <dir name> is the name of the directory above the currently selected directory). A shortcut is to press *Load* then 00 to go directly to the EXIT TO entry.
- Press *Enter•Yes.* Depending on how many directories within directories you have, you may need to perform this operation a number of times to return to the Root Directory level.

To Delete a Directory:

- Make sure that there are no files remaining in the directory. A directory cannot be deleted if it contains any files.
- Press *Load,* then *System* and scroll to the name of the directory you wish to delete. To check the number of files still contained in the directory, scroll left or right while the directory name is displayed.
- With the name of the directory you wish to delete displayed, press and hold *Load,* then press *Cancel•No.* You will be prompted to verify that you wish to continue. If you wish to delete the directory, press *Enter•Yes.* The directory will be deleted from the disk.

You could start saving different instruments into the SOUNDS directory but you would be limited to thirty-eight instruments. Instead, it makes more sense to first create more directories which will contain specific groups of sounds.

Make sure that you are in the directory you think you are in before creating more subdirectories or saving new files (see the Enter Directory command description). This will save you confusion later when looking for your files.

7) CHANGE STORAGE DEVICE

PURPOSE: To determine whether the EPS will use floppy disk or hard disk (SCSI) for storage.

- Select CHANGE STORAGE DEVICE. Press *Enter•Yes.*
- Select LOAD DEVICE=FLOPPY/SCSI 1thru 8.
- You must press *Enter•Yes* to change the storage device. Otherwise, you might get the COMMAND ABORTED message (OS disk version 2.10 or higher).
- Press *Enter•Yes.* The display reads COMMAND COMPLETED.

8) SAVE MACRO FILE (with 2.0 ROM installed)

PURPOSE: Macros provide a way to move quickly from one place in the directory structure to another. Again, they are primarily for use with a SCSI hard disk. See pages 12, 13, and 14 of the *Small Computer System Interface (SCSI) Manual* included with the *optional* Model SP-1 EPS Small Computer System Interface.

9) FORMAT SCSI DRIVE

PURPOSE: See page 5 of the *Small Computer System Interface Manual.*

COMMAND/MIDI Page

To execute the following command, first press *Command,* then *MIDI.*

MIDI SYS-EX RECORDER

PURPOSE: To receive and store MIDI System Exclusive messages. These Sys-Ex messages can be saved to and loaded from disk. *Since the EPS erases the internal memory to "buffer" incoming Sys-Ex signals, it is very important that you save all internal sounds and sequences that are valuable to you before performing this command.*

The MIDI Sys-Ex recorder in the EPS lets you store to disk things like—

- The program (patch) memory of any MIDI synth
- Patterns from a drum machine
- The sequence memory of a MIDI sequencer
- Wavesample dumps from samplers and drum machines
- The preset memory of any MIDI reverb or other effects device employing MIDI.

SAVING System Exclusive Data from an External Device

- Connect the MIDI Out of the sending device to the MIDI In of the EPS.
- Make sure that the EPS O.S. disk is in the disk drive.
- Press *Command,* then *MIDI.* The display shows MIDI SYS-EX RECORDER.
- Press *Enter•Yes.* The display reads MUST ERASE MEMORY OK?
- Press *Enter•Yes.* The display reads WAITING... The EPS is ready to record any System Exclusive message which it receives.
- Send the Sys-Ex data from the external device to the EPS. The display will flash RECEIVING while the Sys-Ex data is being received by the EPS. If the Sys-Ex data have been received successfully, the EPS will display CANCEL=QUIT ENTER=SAVE.

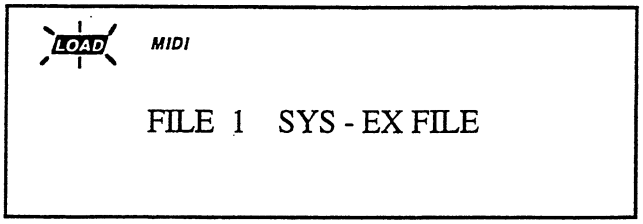
At this point, you can send the EPS another Sys-Ex message (from a different device, for example) which will be stored right after the first one. You can save as many different messages as memory permits in a single Sys-Ex block. Each time a message is received, the display will flash RECEIVING and then return to CANCEL=QUIT ENTER=SAVE. When the data is later re-transmitted, all the messages will be sent out in the order they were received. In this way you could load new data into all you devices with a single Sys-Ex Load command from the EPS.

To save the Sys-Ex file to disk:

- Insert a formatted, double-sided 3.5" disk into the drive of the EPS.
- Pressing *Enter•Yes* displays FILENAME=SYS-EX FILE. You can name your Sys-Ex file by using the Arrow buttons, if you wish.
- Press *Enter•Yes*. The display reads SAVING <filename>, then DISK COMMAND COMPLETED.
- Pressing *Cancel•No* aborts the command.

LOADING System Exclusive Data from Disk to an External Device

- Connect the MIDI Out of the EPS to the MIDI In of the receiving device.
- Press *Load*, then *MIDI*. Scroll until the desired Sys-Ex file is selected. The display looks something like this:



FILE 1 SYS - EX FILE

- Press *Enter•Yes*. The display reads LOADING <filename>.
- The display then reads CANCEL=QUIT ENTER=SEND.
- Press *Enter•Yes* to send the Sys-Ex file to a receiving device, or
- Press *Cancel•No* to abort the command.

After you have sent your MIDI Sys-Ex file to a receiving device, the CANCEL=QUIT ENTER=SEND screen returns. You can re-transmit the data by pressing *Enter•Yes*, in case it was not properly received for some reason.

- Once the data has been successfully received by the external device, you can if you wish make a back-up copy of the file onto a different disk.
- Press *Cancel•No*. The EPS asks RESAVE FILE TO DISK?
- Press *Enter•Yes* to save the Sys-Ex file to disk, or *Cancel•No* if you don't wish to make a backup.

EDIT/System Page

This page contains system (or global) parameters. These parameters are among those which will be saved to the O.S. disk when you SAVE GLOBAL PARAMETERS (COMMAND/System Page). You must first press *Edit*, then *System* before editing any System parameters.

0) FREE SYSTEM BLOCKS

PURPOSE: To determine the amount of available internal memory (in blocks).

- Select FREE SYSTEM BLKS=##.

1) FREE DISK BLOCKS

PURPOSE: To determine the amount of available memory (in blocks) on the disk currently in the drive (or on the hard disk if a SCSI device is selected as the storage device).

- Select FREE DISK BLKS=##.

2) MASTER TUNE

PURPOSE: To adjust the tuning of the keyboard up or down as much as one semitone (from -99 to +99) in increments of one cent.

- Select MASTER TUNE=##. Range: -99 to +99 cents.

3) GLOBAL BEND RANGE

PURPOSE: To adjust the pitch bend range. The bend range is adjustable in one-semitone increments from 0 to 12. Each EPS Wavesample can have its own bend range (which will override the global bend range) or can use this global bend range.

- Select GLOBAL BEND RANGE=##. Range: 0 to 12 semitones.

4) TOUCH (Velocity and Pressure Response)

PURPOSE: To adjust the velocity and pressure response of the keyboard. There are 16 available settings, with four velocity values ranging from SOFT to HARD, and four pressure threshold settings ranging from 1 (least amount of pressure required to bring in modulation effect) to 4 (greatest amount of pressure required).

- Select TOUCH=##. Ranges: SOFT 1-4, MEDIUM 1-4, FIRM 1-4, HARD 1-4.

5) PEDAL (VOLUME/MOD)

PURPOSE: The optional CV Pedal (model CVP-1) can be used as a volume pedal or as a modulator. The volume pedal gets sent as MIDI controller #7. If PEDAL=MOD it will affect anything that has pedal selected as a modulator, and it will go out as MIDI controller #4.

Note: Some Yamaha® TX modules (depending on the software version) receive MIDI controller #4 as volume. If the pedal is not plugged in, MIDI controller #4 will default to 0, which will shut down volume of the TX.

- Select PEDAL=VOLUME MIDI=7 or PEDAL=MOD MIDI=4.

6) SUSTAIN FT SWITCH (Sustain/Patch select)

PURPOSE: To assign the sustain Foot Switch as a Patch Select button.

- When set to SUSTAIN FT SW=SUSTAIN the single SW-1 Foot Switch which comes with the unit, or the right-hand pedal on the optional SW-5 Dual Foot Switch acts as a sustain pedal.
- When set to SUSTAIN FT SW=PATCH the Foot Switch will reproduce the actions of the right-hand Patch Select button, and will cease to act as a sustain pedal.

7) AUX FT SWITCH (Start/Stop/Patch select)

PURPOSE: To assign the aux Foot Switch (available only with the the optional SW-5 Dual Foot Switch) to either start and stop the sequencer or to act as the left-hand Patch Select button.

- When set to AUX FT SW=START/STOP, the left pedal of the SW-5 duplicates the action of the *Stop/Continue* button.
- When set to AUX FT SW=PATCH SEL, the left pedal duplicates the behavior of the left-hand Patch Select button and will cease to act as a sequencer start/stop pedal.

8) AUTO-LOOP FINDING (On/Off)

PURPOSE: To enable or disable the "Expert-System" autoloop function. If the autoloop function is enabled, the EPS will automatically go to zero crossings (with matching wave direction) whenever you move the loop start or end pointer. This is a very useful feature because finding zero crossings is essential to creating glitch-free loops. If the autoloop function is disabled, the loop start and end parameters will move in one-sample increments. See page 13 for more information.

- Select AUTO-LOOP FINDING=On/Off.

EDIT/MIDI Page

The parameters on this page control the MIDI configuration of the EPS. Press *Edit*, then *MIDI* and scroll to (or direct-dial) the desired parameter and adjust its value using the Up/Down Arrow buttons or the Data Entry Slider.

0) MIDI BASE CHANNEL

PURPOSE: The base channel is the MIDI channel which the EPS will receive on in POLY and MONO A Modes. In MULTI and MONO B Modes, the EPS will receive on consecutive channels ascending from the base channel. See pages 29, 31, and 32 of the *Musician's Manual.*

- Select MIDI BASE CHANNEL=##. Range: MIDI channels 1 through 16.

1) TRANSMIT ON (Inst Chan/Base Chan)

PURPOSE: When set to INST CHAN, each of the eight EPS Instruments will send on its own MIDI channel (or not at all, if assigned LOCAL status). Each Instrument will have its own MIDI program number and its own PRESSURE setting. When set to BASE CHAN, the EPS will always transmit notes, controllers and program changes on the Base MIDI channel and *only* on that channel, no matter what Instruments are selected from the front panel. See page 29 of the *Musician's Manual.*

- Select TRANSMIT ON=BASE CHAN/INST CHAN.

2) BASE CHAN PRESSURE

PURPOSE: When TRANSMIT ON is set to BASE CHAN the EPS will send either Key or Channel pressure or no pressure at all. When TRANSMIT ON=INST CHAN, this setting is ignored and each Instrument transmits pressure according to its own setting.

- Select BASECHAN PRESSURE=OFF. This setting turns pressure off entirely over MIDI.
- Select BASECHAN PRESSURE=KEY. This enables the EPS to send via MIDI the most expressive type of pressure—key pressure. The EPS's Poly-Key pressure lets you modulate each note independently. If you press down on any given key within a chord, only that note will be affected by pressure—all other remain unmodulated.
- Select BASECHAN PRESSURE=CHAN. This enables the EPS to send via MIDI the most common type of pressure—channel pressure. With channel pressure—after a note is played, pressing down harder on the key modulates *every* note currently playing. Like a mod wheel, channel pressure is "global," it affects the entire keyboard when activated.

You can consult the MIDI implementation chart of the MIDI device you will be using in conjunction with the EPS and its sequencer, to see which, if any, type of pressure it responds to. Set this parameter to the appropriate value when playing or sequencing a particular device from the EPS.

3) MIDI IN MODE

PURPOSE: To determine how MIDI information will be received over MIDI by the EPS and its various Instruments. See pages 31 and 32 of the *Musician's Manual* for more information.

- Select MIDI IN MODE=OMNI/POLY/MULTI/MONO A/MONO B.

4) MIDI CONTROLLERS (On/Off)

PURPOSE: This determines whether the EPS will send and receive MIDI controllers—pitch bend, mod wheel, pressure, volume, sustain, etc.

- Select MIDI CONTROLLERS=ON/OFF.

5) MIDI SYS-EX (On/Off)

PURPOSE: The setting of this parameter determines whether the EPS will send or receive MIDI System Exclusive messages, such as remote programming instructions or Wavesample dumps. When OFF, the EPS will neither transmit nor receive System Exclusive messages.

NOTE: This parameter does not have to be on for the EPS to record and store Sys-Ex messages from external devices using its MIDI Sys-Ex recorder function on the COMMAND/MIDI Page.

- Select MIDI SYS-EX=ON/OFF.

6) MIDI PROG CHANGE (On/Off)

PURPOSE: To enable the EPS to transmit and receive program changes over MIDI (the default is ON). See page 32 of the *Musician's Manual* for more on program changes.

- Select MIDI PROG CHANGE=ON/OFF.

7) MIDI SONG SELECT (On/Off)

PURPOSE: To instruct a remote sequencer or drum machine to select a new song whenever you select a new song on the EPS (the default is ON).

- Select MIDI SONG SELECT=ON/OFF.

Whenever there is a song in memory, MIDI song select numbers can be assigned as follows:
- Press *Command*, then *Seq•Song*. Scroll to SEQUENCER INFORMATION.
- Press *Enter•Yes*. The display reads MIDI SONG SELECT=##.
- Select MIDI song numbers 0 through 127. When set to 0 this parameter is effectively turned off.

8) MIDI XCTRL NUM

PURPOSE: Each MIDI controller on a synthesizer (breath controller, mod wheel or pressure, for example) has a standardized MIDI number which is the number you select to make a particular controller affect the Wavesample parameters which can be modulated. One of the modulators that can be selected to modulate Wavesample pitch, volume, filter frequency, etc. is XCTRL (external controller).

Suppose you are driving the EPS from a keyboard with a breath controller (or want to use breath controller as a modulator when playing the EPS keyboard). You can set up a Wavesample on the EPS where the filter cutoff frequency, or some other manual level, is modulated by XCTRL. Then assign this parameter a value of XCTRL= 02. The breath controller will now modulate the filter, or whatever, on this Wavesample. The chart below lists the accepted MIDI controller numbers.

The following controller numbers have been agreed upon:

Number	Controller	Number	Controller
1	modulation wheel	66	sostenuto pedal
2	breath controller	70	patch selects
4	foot pedal controller	92	tremolo
6	Data Entry Slider	93	chorus
7	volume pedal	94	celeste
		95	phaser

Though the range of this control is from 0 to 127, most of the values other than those listed above have no accepted function, as yet. They are there to accommodate future MIDI standards.

- Select MIDI XCTRL NUM=0 through 127.

COMMAND/Instrument Page

To execute the following commands, first press *Command*, then *Instrument*.

0) CREATE NEW INSTRUMENT

PURPOSE: To create a new Instrument. This is useful for creating Instruments which will only play out the MIDI port (MIDI Instruments). See page 30 of the *Musician's Manual.*

- Select CREATE NEW INSTRUMENT.
- Press *Enter•Yes*. The display reads SELECT UNUSED INSTR=##.
- Press one of the unused Instrument•Track buttons.
- Press *Enter•Yes.* The display reads COMMAND COMPLETED.

1) COPY INSTRUMENT

PURPOSE: To copy the selected Instrument. This is useful for making copies of an Instrument in several tracks for sequencing. The copies don't use any internal memory, they just "point to" the data in the original Instrument (see Copy Commands, page 27).

- Select COPY INSTRUMENT.
- Press *Enter•Yes*. The display reads SELECT UNUSED INST=##.
- Press one of the unused Instrument•Track buttons.
- Press *Enter•Yes.* The display reads COMMAND COMPLETED.

Shortcut:
- Make sure the Instrument you want to copy is selected.
- While holding down the empty Instrument•Track button that you want to copy the *selected* Instrument to, press *Enter•Yes.*

2) DELETE INSTRUMENT

PURPOSE: To delete the selected Instrument from the internal memory.

- Select DELETE INSTRUMENT.
- Press *Enter•Yes.* The display reads DELETE (name of Instrument)?
- Press *Enter•Yes.* The display reads COMMAND COMPLETED.

Shortcut:
- Make sure the Instrument you want to delete is selected.
- While holding down the Instrument•Track button of the Instrument you want to delete, press *Cancel•No.*

3) SAVE INSTRUMENT

PURPOSE: To save the selected Instrument. See pages 20 and 47 of the *Musician's Manual.*

SAVING LARGE FILES TO MULTIPLE DISKS (O.S. version 1.95 and higher)
It is possible to save Instruments that are larger than the capacity of a single floppy disk. The EPS will save part of the Instrument on one disk, and then instruct you to insert additional disks as needed. The EPS will only save an Instrument to multiple disks if one of these conditions is met:

1) The disk you are saving the Instrument to must be blank. It can't contain any files (Instrument, bank, sequence, song, MIDI, or system files). Or...

2) If the disk is not blank, then it must have only one file. This file must be a previous version of the Instrument, and it must have the same name. If neither of these conditions is met, the EPS will display NOT ENOUGH DISK SPACE. Otherwise, the EPS will display USE MULTIPLE DISKS? to inform you the file you are saving will take more than one disk. Pressing *Enter•Yes* here will start the multi-disk save procedure. When the EPS has saved as much of the file as possible on the first disk, it will display INSERT DISK-HIT ENTER. At this point insert another disk for the rest of the file. The EPS will prompt you to insert as many disks as it takes to save the file; the number of disks depends upon how much expanded memory you have and the size of the Instrument you're saving.

As you scroll through a directory, you will notice that files that have been saved as part of a multiple-disk Instrument will appear with a dot appended to the Instrument's name. For example:

FILE 1 UNNAMED INST 1.

LOADING A MULTI-DISK INSTRUMENT
The number indicates the sequence you should use when re-loading the Instrument. To load these multiple-disk Instruments:

- Load the first part as you would any other Instrument.
- Then, without leaving LOAD mode, insert the disk containing the second part of the multiple-disk Instrument.
- Press *Load.* When you scroll to the file, the display will look something like this:

FILE 1 UNNAMED INST 2.

- Press *Enter•Yes.* The EPS will display PICK INSTRUMENT BUTTON. Choose the same Instrument you selected when you loaded the first part of the multiple-disk Instrument, and the EPS will append the second part to the first. Repeat this procedure for each part of your multiple-disk Instrument. The important thing is:

Don't press Command or Edit until the entire Instrument is loaded!

If you do, you may crash the EPS and be forced to re-boot. If you have part of the Instrument loaded and then decide you don't really want to load it, or there is some problem loading the rest of the Instrument, delete the Instrument. You can delete the Instrument by holding down the button for that Instrument and pressing *Cancel•No.*

4) SAVE BANK
PURPOSE: See pages 11 and 21 of the *Musician's Manual.*

5) CREATE PRESET
PURPOSE: See pages 17 and 18 of the *Musician's Manual.*

COMMAND/Layer Page

To execute the following commands, first press *Command*, then *Layer*.

0) CREATE NEW LAYER

PURPOSE: To create a new layer.

- Select CREATE NEW LAYER.
- Press *Enter•Yes*. The display reads LAYER ## CREATED.

1) COPY LAYER

PURPOSE: To copy an existing layer and all the Wavesamples in it, either within an Instrument or from one Instrument to another (see next page).

- Select COPY LAYER. The display reads TO INST=UNNAMED INST.
- Select the destination Instrument. Press *Enter•Yes*.
- Select COPY=PARAMS ONLY/PARAMS+DATA.
- Press *Enter•Yes*. The display reads LAYER ## CREATED.

2) DELETE LAYER

PURPOSE: To delete a layer.

- Choose the layer you want to delete.
- Select DELETE LAYER.
- Press *Enter•Yes*. The display reads DELETE LAYER ##.
- Press *Enter•Yes* or *Cancel•No*.

NOTE: If you get the message NO EDIT LAYER SELECTED, simply press *Edit* and select the layer you want to copy or delete is selected and then proceed with the command.

UNDERSTANDING COPY COMMANDS

The EPS can copy Instruments, Layers, Wavesamples, wavedata, sequences, and tracks, using commands found on these various pages (COMMAND/Instrument, COMMAND/Layer, COMMAND/Wave, etc.). Some of these functions actually *create new data*, while others *share existing data.* As you go deeper into the EPS, you will need to recognize the difference.

The commands which always create new data are: COPY SEQUENCE, COPY TRACK, COPY PITCH TABLE, and COPY DATA. You'll notice that free memory has diminished after you execute one of these commands.

COPY INSTRUMENT (COMMAND/Instrument Page)

COPY INSTRUMENT does not copy any data. This command is provided so that two or more sequencer tracks can share the same Instrument. After an Instrument is copied to another Instrument•Track location, there is still only one set of Wavesamples in memory; if you change one, you will change the other. The only parameters which are kept separate for each copy are the *Instrument* parameters on the EDIT/Instrument Page. These parameters include Patch Select, MIDI program number, and the track parameters (mix, pan, etc.). This command also has a short-cut: hold an empty Instrument•Track button and press *Enter•Yes.*

COPY WAVESAMPLE (COMMAND/Wave Page)

COPY WAVESAMPLE can either create new data or share existing data. It can duplicate the waveform data, which takes up more memory. If you are copying *between* Instruments, this is necessary. It can also *share* waveform data, which will conserve memory. This is only possible when copying *within* an Instrument. The WAVESAMPLE INFORMATION command will tell you whether the current Wavesample is a copy of another Wavesample. In this case, the word *copy* means that the current Wavesample will play wavedata which is "owned" by another Wavesample.

COPY LAYER (COMMAND/Layer Page)

The COPY LAYER command copies all the Wavesamples from the EDIT Layer (displayed when you press the EDIT button) to the destination Layer, which will be created when you execute the command. There are three main applications for the COPY LAYER COMMAND.

- This command can be used to create an exact copy of one component of an Instrument's sound which may then be detuned to create a fatter sound. In this instance, you would use the currently selected Instrument as the "destination" Instrument, and you would select PARAMS ONLY as the Copy parameter. Selecting PARAMS ONLY means that the new Layer will share the wavedata with the source Layer, although each Layer's Wavesamples will have separate parameters. Then you can detune each Wavesample in the new Layer using the FINE TUNE parameter on the PITCH page. Since the wavedata was not changed, it would have wasted valuable memory to make a duplicate copy of it in the new Layer.

- A second application of the COPY LAYER command is setting up variations of a sound for different Patch Selects. For example, suppose an Instrument is comprised of two Layers, 1 and 2, and you want to make a variation with a longer attack time and assign it to the left Patch Select button. You could use COPY LAYER with PARAMS ONLY selected for each Layer, and create new Layers, 3 and 4. Then assign the new Layers to the left Patch Select button. Patch assignment are covered in the tutorial UNDERSTANDING WAVESAMPLES, LAYERS AND PATCHES.

- A third application of the COPY LAYER command is to copy Wavesamples and Layers from one Instrument to another Instrument. If you select a different Instrument as the destination Instrument, you will not be asked if you want to copy PARAMS & DATA or PARAMS ONLY. In this case, the PARAMS & DATA option will automatically be selected by the EPS, because different Instruments *cannot* share wavedata. Once the copy is completed, the EPS indicates which Layer was created on the destination Instrument. If you assign that Layer to a Patch Select in the destination Instrument, you should hear it when you play the keyboard.

COPYING MULTIPLE LAYERS INTO A DIFFERENT INSTRUMENT

You should note that the EPS *always* duplicates the data when copying Layers between Instruments. For this reason, using the COPY LAYER command for each Layer in an Instrument could result in a much larger destination Instrument. For example, if you copied two Layers from an Instrument where one Layer was a "detuned copy" of the other Layer, the result would be two Layers with identical wavedata. A more efficient way to do this would be to copy one Layer and then select the destination Instrument and copy the new Layer, selecting PARAMS ONLY. The EPS will not duplicate wavedata if two or more Wavesamples within a Layer to be copied share the same wavedata; however, the wavedata may end up in a different Wavesample than it was in the source Layer.

Suppose you have two Layers with two Wavesamples each:

- In Layer 1, there is a bass sample in a Wavesample 1 that covers the bottom half of the keyboard. In the upper half of the keyboard in Layer 1 is Wavesample 2 is a copy of Wavesample 1 with a different filter setting.
- Layer 2 has a Wavesample 3 on the bottom half of the keyboard which is a copy of Wavesample 1, but slightly detuned. On the top half of the keyboard in Layer 2, you have a plucked string sample, Wavesample 4, with its own wavedata.

If you copied Layer 1 to a different Instrument, only one of the new Wavesamples would contain wavedata; which Wavesample contained the actual data would depend on whose range was most recently set. The important thing to note here is that no wavedata would be duplicated unnecessarily within the new Layer.

If you then copied Layer 2 to the new Instrument, both new Wavesamples in the new Layer would contain wavedata. This is because the COPY LAYER command has no way of knowing that the data it needs for WS 3 is already in the new Instrument. Even if it knew, it could not know whether the data had been manipulated or changed. So you would end up with redundant data in WS 1 and WS 3.

The way to get around this is to delete the new copy of Wavesample 3 in the new Layer and then use COPY WAVESAMPLE (PARAMS ONLY) to copy the new copy of Wavesample 1 to the second Layer. Then you could use the COPY WAVE PARAMETERS command to copy the parameters from the original Wavesample 3 (in the source Instrument) to the new Wavesample. Again, if you want to find out which Wavesamples are copies and which are originals, use the WAVESAMPLE INFORMATION command. If the Wavesample is a copy, this command will display which Wavesample contains the wavedata.

WAVESAMPLE COMMANDS

There are twenty-eight commands for working with Wavesamples and wavedata. Rather than putting them all on one Page, they are broken down into three Pages.

The COMMAND/Wave Page contains the standard copy and delete commands for Wavesamples, plus a number of looping commands.

The COMMAND/Amp and COMMAND/LFO Pages contain amplitude and wavedata processing commands respectively. Some of these are fairly "low-level" operations that are rarely used. They are included for completeness.

Many of the commands have a single digit before their name: 1) COPY WAVESAMPLE. This is the "direct-dial" number. For more on direct-dialing see page 2.

Before you can perform any of the following commands, you must first go to the EDIT Page and select the specific Layer and Wavesample you want to work on.

- Press the *Edit* button.
- The display reads (for example) UNNAMED INST LYR=1 WS=1.
- Use the Arrow buttons to select the Layer and Wavesample you want to change.
- Press *Command*, then *Wave*, *Amp*, or *LFO*.

Now you are ready to execute any of the following commands.

Always make sure the Wavesample you want to edit is selected on the EDIT Page!

MESSAGES:
If you get the message NO EDIT WS SELECTED, you must go to the *EDIT* Page and select a Wavesample you want to work on.

When the EPS displays WAVESAMPLE IS A COPY, it means the Wavesample you are editing is not an original, but a copy. If you press *Enter•Yes* in response to this message, the EPS will take the data from the original Wavesample and copy it into the Wavesample you are editing. This will make the Wavesample you are editing larger. If this is undesirable, use the WAVESAMPLE INFORMATION command (page 30) to determine which Wavesample is the original. Then perform the command on the original. See page 27 and 30 for more on COPY WAVESAMPLE.

When the EPS displays LAYER NOT IN PATCH, press *Edit*, then *Instrument*. Use the Arrow buttons and enable the Layer in the Patch, as described earlier in this supplement.

NOTE: Wherever you see the notation ##, that symbol will represent the numeric value of a parameter whose setting or level is considered arbitrary to the subsequent discussion. For example, in the case of SCALE DEPTH= ## DB, the ## represents the entire range of this parameter. You can use the Data Entry Slider or Up/Down Arrow buttons to explore these ranges.

COMMAND/Wave Page

0) CREATE NEW WAVESAMPLE

PURPOSE: One of the primary functions of the EPS is to CREATE NEW WAVESAMPLES by sampling external sound sources. However, the EPS can also create a Wavesample without sampling. The CREATE NEW WAVESAMPLE command creates a small squarewave.

- Press *Command*, then *Wave*. Select CREATE NEW WAVESAMPLE.
- Press *Enter•Yes*. The display reads, WAVESAMPLE ## CREATED.

1) COPY WAVESAMPLE

PURPOSE: To make a copy of a Wavesample and its data, or a copy of its parameters only. See UNDERSTANDING COPY COMMANDS on page 27.

COPY WAVESAMPLE lets you use the same section of data to change envelopes, tuning, and other parameters. You can copy the parameters and data of the original Wavesample, or just the parameters. Selecting PARAMS ONLY helps conserve memory. For example, you can create huge stereo mixes by placing original Wavesamples on the left channel, and copies on the right and then detuning the copies.

- Press *Command*, then *Wave*. Select COPY WAVESAMPLE. Press *Enter•Yes*.
- The display reads TO INST=UNNAMED. Press an Instrument•Track button to choose the destination Instrument (if necessary). Press *Enter•Yes*.
- The display reads TO LAYER=##. Using the Up/Down Arrow buttons, select a destination Layer. Press *Enter•Yes*.
- Select COPY=PARAMS ONLY or COPY=PARAMS & DATA. Press *Enter•Yes*. The display reads WAVESAMPLE ## CREATED.

2) DELETE WAVESAMPLE

PURPOSE: Use DELETE WAVESAMPLE to erase unneeded Wavesamples from memory. For example, deleting wavesamples of drum sounds that you don't need from a drum kit.

- Be sure the Wavesample you want to delete has been selected on the EDIT Page.
- Press *Command*, then *Wave*. Scroll to DELETE WAVESAMPLE. Press *Enter•Yes*.
- The display will read DELETE WAVESAMPLE ## ? If this is the Wavesample you want to delete, press *Enter•Yes*. If not, press *Cancel•No*.

3) WAVESAMPLE INFORMATION

PURPOSE: You can use WAVESAMPLE INFORMATION to name a Wavesample; find out the sample rate; determine whether a Wavesample is a copy; and what the root key is. The WAVESAMPLE INFORMATION command is used primarily for reference, and is useful for keeping track of things when you are developing sounds.

- Press *Command*, then *Wave*. Scroll to WAVESAMPLE INFORMATION. Press *Enter•Yes*.
- The display reads WS NAME=#####. Press *Enter•Yes*.
- The display reads SAMPLE RATE=48.0 KHZ to 6.25 KHZ. Press *Enter•Yes*.
- The display reads ROOT KEY=##. Press *Enter•Yes*.
- If the Wavesample is a copy, the display will read COPY OF LYR ## WS ##.

If you get the message, LAYER NOT IN PATCH, press *Edit*, then *Instrument*. Use the Arrow buttons and enable the Layer in the Patch.

4) TRUNCATE WAVESAMPLE

PURPOSE: Truncating removes data before sample start, and after sample end. The memory formerly used by the truncated data is then returned to the available memory. *The EPS will not truncate the Wavesample if there are copies which use the same data.* You must move the sample start and end of all the copies. See page 28 of the *Musician's Manual* for more information.

- Press *Command*, then *Wave*. Scroll to TRUNCATE WAVESAMPLE. Press *Enter•Yes.*

NOTE: In the following Loop Commands, the messages INCREMENT LOOPSTART, or DECREMENT LOOPEND may appear. When they do, the EPS is letting you know there's a problem with the loop length. Try changing the FADE ZONE. You could also press *Edit*, then *Wave*, and adjust the loop points. To move the loop points one sample at a time, make sure AUTO-LOOP FINDING (EDIT/System Page) is set to OFF.

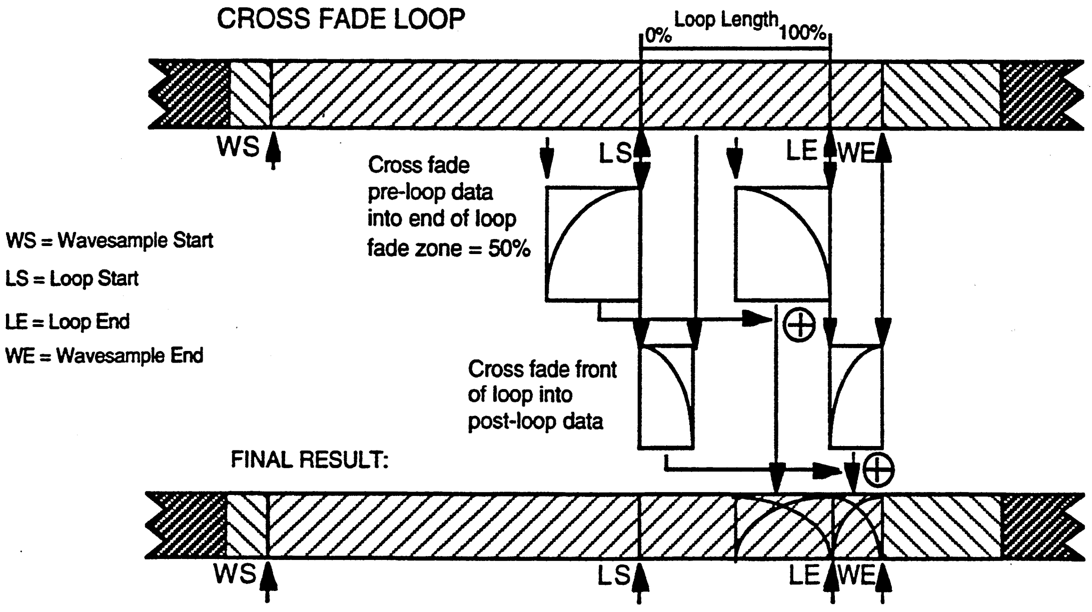
5) CROSS FADE LOOP

PURPOSE: The idea behind cross fading is to blend the data preceding the start of the loop with the data at the end of a loop, for a smooth transition between the two. The CROSS FADE LOOP command is a simple crossfade which works well with periodic waveforms that are relatively constant in tone. The default values are: scale depth=3 dB; fade zone=50%. Manual settings are: scale depth=3.0 dB to 6 dB, fade zone=1% to 99%. With manual settings, 3 dB will give you an exponential curve, while 6 dB is linear.

- Press *Command*, then *Wave*. Scroll to CROSS FADE LOOP. Press *Enter•Yes.*
- The display reads USE DEFAULT VALUES? Press *Enter•Yes.*
- The display reads KEEP=OLD NEW. Underline NEW and play the keyboard to hear the new loop, or underline OLD to hear the original. Underline NEW and press *Enter•Yes* to keep the new loop. Or, press *Cancel•No* to keep the old loop. If you press *Cancel•No*, in any event, you will keep the OLD no matter where the cursor is located.

Whenever the KEEP=OLD NEW message appears, the EPS is giving you the chance to "audition" the results of the operation, before you commit any changes to memory.

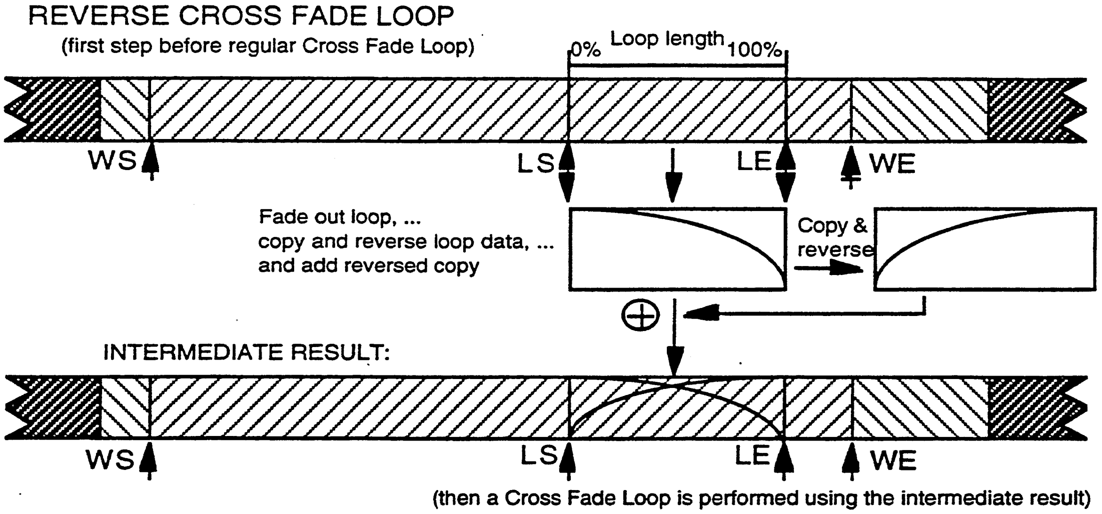
- Pressing *Cancel•No* in response to USE DEFAULT VALUES, prompts the EPS to display the manual values for this command: SCALE DEPTH=(3.0, 3.5, 4.0, 4.5, 5.5, or 6.0 DB). FADE ZONE (PERCENT)=(1 TO 99). Use the Up/Down Arrow buttons, or the Data Entry Slider to change the scale depth or fade zone. Press *Enter•Yes.*
- The display reads KEEP=OLD NEW. Press *Enter•Yes* to complete the command (or *Cancel•No* to keep the original).



6) REVERSE CROSS FADE LOOP

PURPOSE: The reverse cross fade loop helps eliminate tonal bumps, and smooths out the tonal content of the loop. The reverse crossfade works well with multiple source sounds such as string sections, brass ensembles, and choirs. The default and manual values are the same as in the cross fade.

- Press *Command*, then *Wave*, and select REVERSE CROSS FADE. Press *Enter•Yes*.
- The screen will ask, USE DEFAULT VALUES? Press *Enter•Yes.*
- Pressing *Cancel•No* in response to USE DEFAULT VALUES? displays the manual values: SCALE DEPTH=## DB. Scroll to FADE ZONE (PERCENT)=##. Press *Enter•Yes.*
- The display reads KEEP=OLD NEW. Press *Enter•Yes* to complete the command (or *Cancel•No* to keep the original).


REVERSE CROSS FADE LOOP
(first step before regular Cross Fade Loop)
0% Loop length 100%
WS
LS
LE
WE
Fade out loop, ...
copy and reverse loop data, ...
and add reversed copy
Copy & reverse
⊕
INTERMEDIATE RESULT:
WS
LS
LE
WE
(then a Cross Fade Loop is performed using the intermediate result)

7) ENSEMBLE CROSS FADE

PURPOSE: The ensemble is essentially a cross fade loop with the fade zone set to 100%. If you use the default values, the EPS may tell you DEFAULTS CANNOT BE SET. Then it will advise, INCREMENT LOOP START or, DECREMENT LOOP END (EDIT/Wave Page). This is because the data preceding the loop is shorter than the loop itself. For the ensemble cross fade to work, the fade zone must be 100% of the loop length. You can either make sample start smaller so that you add more data preceding the loop, or move the loop around using loop position on the EDIT/Wave Page. The only manual setting here is SCALE DEPTH which is the same as the cross fade. The fade zone is not a parameter, because it is always assumed to be 100% of the loop length.

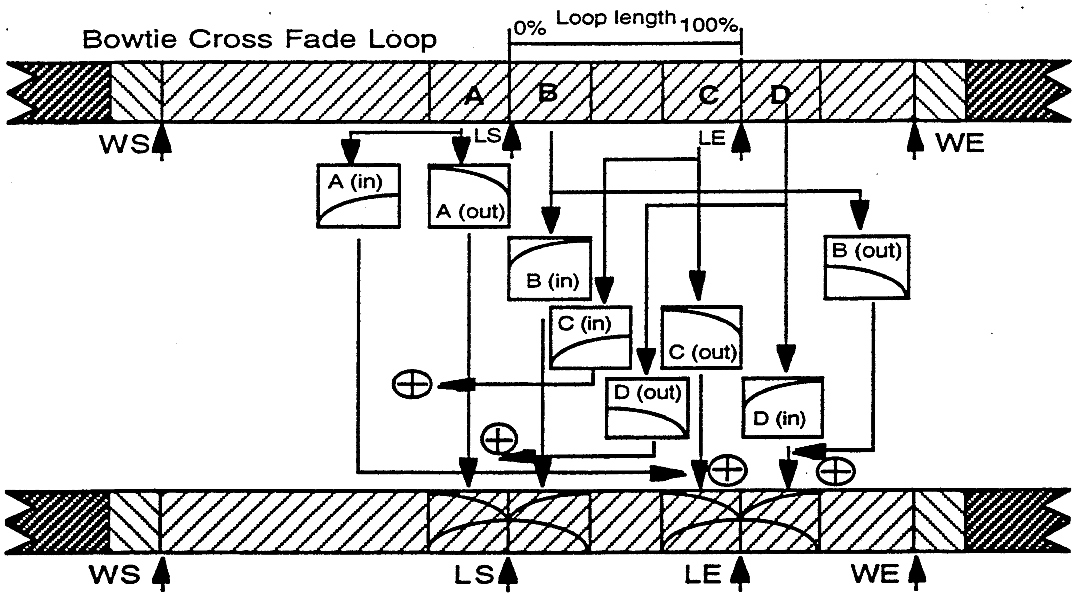
- Press *Command*, then *Wave*, and select ENSEMBLE CROSS FADE. Press *Enter•Yes.*
- The display reads USE DEFAULT VALUES? Press *Enter•Yes.*
- Pressing *Cancel•No* in response to USE DEFAULT VALUES? displays the manual values: SCALE DEPTH=## DB. Press *Enter•Yes.*
- The display reads KEEP=OLD NEW. Press *Enter•Yes* to complete the command (or *Cancel•No* to keep the original).

8) BOWTIE CROSS FADE

PURPOSE: To equalize the data around the loop points so the transition in to and out of the loop splice point is very smooth. The bowtie cross fade works well on sounds with a lot of ambience, reverb, or other effects. The bowtie cross fade zone can never be greater than 50%, otherwise you will overlap data halfway through the loop. The bowtie cross fade is limited by the length of the post-loop data (the data from loop end to Wavesample end).

If you truncate a sound with Wavesample end equal to loop end, you will not be able to do the bowtie Loop, because it needs some of the data after loop end to make the loop. There would not be enough post-loop data to follow the command. If this happens, the EPS will advise, DECREMENT LOOPEND. For the Bowtie you need to have the loop away from the ends of the Wavesample. You can decrement loop position in the same way you had incremented it for the ensemble cross fade. The default values are the same as the cross fade. The manual settings are: fade zone, 1% to 50%; scale depth, 3 dB to 6 dB.

- Press *Command*, then *Wave*. Select BOWTIE CROSS FADE LOOP. Press *Enter•Yes*.
- The display reads USE DEFAULT VALUES? Press *Enter•Yes*.
- Pressing *Cancel•No* to USE DEFAULT VALUES? displays the manual values: SCALE DEPTH=## DB, FADE ZONE (PERCENT)=##. Press *Enter•Yes*.
- The display reads KEEP=OLD NEW. Press *Enter•Yes* to complete the command (or *Cancel•No* to keep the original).



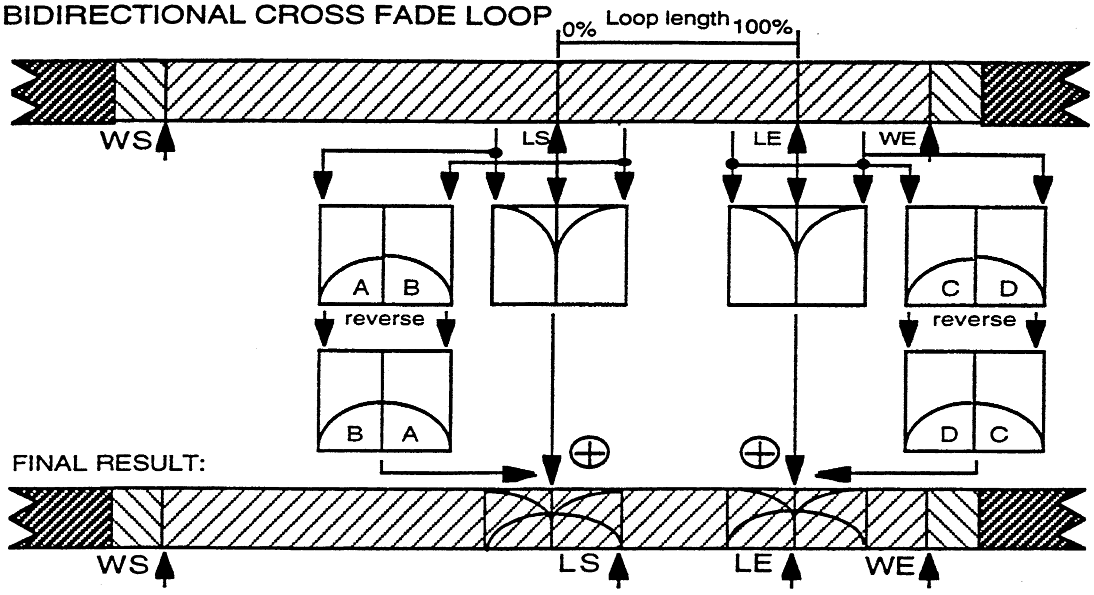
9) BIDIRECTIONAL X-FADE

PURPOSE: This crossfade is optimized for use with bidirectional loops. One of the main advantages of the bidirectional loop (which you can select on the EDIT/Wave Page) is that it makes a loop that sounds twice as long as the amount of data being used. It does this by playing the loop forward and backward. As a result, the bidirectional loop is very memory conservative and is best suited for ensemble sounds which have a slowly modulated sustain, such as the bowing in a string section.

The default and manual values are the same as the cross fade. It is very important to remember that the loop points should be adjusted with autolooping off. Unlike other looping algorithms which look for a "zero crossing," the bidirectional works best when the loop points are set to the peaks in the Waveform.

- Press *Command*, then *Wave*. Select BIDIRECTIONAL X-FADE. Press *Enter•Yes*.
- The display reads USE DEFAULT VALUES? Press *Enter•Yes*.
- Pressing *Cancel•No* in response to USE DEFAULT VALUES? displays the manual values: SCALE DEPTH=## DB, FADE ZONE (PERCENT)=##. Press *Enter•Yes*.
- The display reads KEEP=OLD NEW. Press *Enter•Yes* to complete the command (or *Cancel•No* to keep the original).

BIDIRECTIONAL CROSS FADE LOOP



NOTE: When using the MAKE LOOP LONGER, SYNTHESIZE LOOP, or CONVERT SAMPLE RATE commands, you should select only the Layer which contains the Wavesample you want to work on. If there are copies of the Wavesample you are editing elsewhere in the Instrument, the EPS will display the COPIES WILL CHANGE-OK? message.

For instance, if you try to execute the convert sample rate command and the COPIES WILL CHANGE-OK? message appears, it is possible the conversion may produce apparent pitch problems. This is because the pitch parameters haven't been converted yet. However, they will be converted once you decide to choose KEEP=NEW. With the MAKE LOOP LONGER and SYNTHESIZE LOOP Commands, the loops may sound odd until you choose KEEP=NEW.

- MAKE LOOP LONGER

PURPOSE: If you are having a hard time getting a satisfactory loop—after you've tried the other looping commands—try making the loop longer. This process physically enlarges the loop, making the periodicity of the loop less noticeable. However, there is a trade-off: longer loops use more memory. The default and manual values are the same as the cross fade. *This is not recommended for bidirectional loops.*

- Press *Command*, then *Wave*. Scroll to MAKE LOOP LONGER. Press *Enter•Yes*.
- The display reads USE DEFAULT VALUES? Press *Enter•Yes*.
- Pressing *Cancel•No* displays the manual values: SCALE DEPTH=## DB, FADE ZONE (PERCENT)=##. Press *Enter•Yes*.
- The display reads KEEP=OLD NEW. Press *Enter•Yes* to complete the command (or *Cancel•No* to keep the original).

- SYNTHESIZED LOOP

PURPOSE: This is the algorithm to use when all other looping techniques have failed to make a smooth loop. Unlike the other looping algorithms, the "synth loop" uses a certain amount of random data processing. It's a "loop anything" algorithm, which works well with special effects. With the "smoothness" parameter, the smoother the loop, the more processes the EPS goes through to create the synth loop. For example, if you did a synth loop on a voice sample, and the "smoothness" was set to very coarse, it may create a loop that sounds irregular or nervous. At the other extreme, if the setting is too fine, it may sound metallic. The default values are the same as the cross fade. Manual settings: fade zone=1% to 99%. Smoothness=Very Fine to Very Coarse.

- Press *Command*, then *Wave*. Scroll to SYNTHESIZED LOOP. Press *Enter•Yes*.
- The display reads USE DEFAULT VALUES? Press *Enter•Yes*.
- The display reads KEEP=OLD NEW. Press *Enter•Yes*.
- Pressing *Cancel•No* to USE DEFAULT VALUES? prompts the EPS to display the manual values: FADE ZONE (PERCENT)=##. Scroll to and select, SMOOTHNESS=VERY FINE, FINE, MEDIUM, COARSE, VERY COARSE. Press *Enter•Yes*.
- The display reads KEEP=OLD NEW. Press *Enter•Yes* to complete the command (or *Cancel•No* to keep the original).

- CONVERT SAMPLE RATE

PURPOSE: This command effectively resamples a sound at a different sampling rate. You can start sampling with a high rate, then if you need more memory later, you can convert to a lower sample rate. The EPS lets you compare these conversions before committing them to memory. When you convert from a higher to a lower sample rate, it's like transposing the sound up the keyboard: you play fewer samples and the sound is shorter. Conversely, a lower to a higher sample rate has the effect of transposing down the keyboard: the sound gets bigger, and stretches out. Manual values: Sample Rate 48.0 KHZ down to 6.25 KHZ.

- Press *Command*, then *Wave*. Scroll to CONVERT SAMPLE RATE. Press *Enter•Yes*.
- The display reads SAMPLE RATE=## KHZ. Use the Data Entry Slider or Up/Down Arrow buttons to select a new sample rate. Press *Enter•Yes*.
- The display reads KEEP=OLD NEW. Press *Enter•Yes* to complete the command (or *Cancel•No* to keep the original).

- COPY WAVE PARAMETERS

PURPOSE: To copy all the parameters (but not the data) from a source Wavesample to a destination Wavesample. All the parameters (envelopes, filters, amp, pitch, mod parameters, etc.) are copied from the source Wavesample to the destination Wavesample, with the exception of the actual sample points (sample start/end, loop start/end).

- Press *Command*, then *Wave*. Scroll to COPY WAVE PARAMETERS. Press *Enter•Yes*.
- The display reads TO INST=## LYR=## WS=##. Select the destination Instrument, Layer, and Wavesample. The current (or EDIT) Wavesample is used as the source.
- Press *Enter•Yes*. The display reads COMMAND COMPLETED.

COMMAND/Amp Page

These Wavesample commands are accessed by pressing *Command*, then *Amp*. Most of them have something to do with the amplitude of the wavedata.

0) NORMALIZE GAIN

PURPOSE: This command maximizes the dynamic range of a Wavesample. Normalize gain always works on the EDIT Wavesample and has no parameters. It will make the sound louder, unless it is already at full level. Normalize gain finds the largest sample value, and uses that to scale the whole range of the sample to its absolute full level.

- Press *Command*, then *Amp*. Select NORMALIZE GAIN. Press *Enter•Yes* to complete the command.

1) VOLUME SMOOTHING

PURPOSE: Volume smoothing works like a dynamic compressor. The idea is to remove amplitude changes. The degree to which it does this is determined by "smoothness." It works on a given range of sound, determined by the start and end address parameters. This command is very useful for smoothing out a loop, and getting rid of clicks caused by volume bumps.

For instance, if you are working with a piano loop, there is a natural envelope that is always decaying. If you try to loop on the section that is decaying, the loop end data will be at a much lower amplitude than the beginning. You would end up with a click, because of an abrupt change in amplitude. Volume Smoothing will help make the level constant. When the EPS displays DATA RANGE TOO SMALL, it is advising you that the minimum range to perform this command is 256 Samples.

This command is most useful for loops, but you can use it on the whole sample. If you wanted to remove a natural envelope from a piano, for example, you can use volume smoothing over the whole length of the sample. You can then superimpose any amplitude envelope from the EPS over that sample. Scale Depth=3.0 to 6.0 dB. Smoothness=very fine to very coarse.

- Press *Command*, then *Amp*. Select VOLUME SMOOTHING. Press *Enter•Yes*.
- The display reads USE LOOP FOR RANGE? Press *Enter•Yes* to automatically set the start and end addresses to the loop points.
- Select START ADDR=## (##). Use the Left/Right Arrow buttons to scroll through the various screens. Use the Up/Down Arrow buttons to change the values in the display.
- Scroll to and select END ADDR=## (##). Scroll to and select the SCALE DEPTH=## DB. Scroll to and select the SMOOTHNESS=####. Press *Enter•Yes*.
- Select KEEP=OLD NEW. Press *Enter•Yes* to complete the command.
- Pressing *Cancel•No* for USE LOOP FOR RANGE? lets you adjust the start and end addresses manually.
- Select START ADDR=## (##). Scroll to and select the END ADDR= ## (##).
- Scroll to and select the SCALE DEPTH=## DB. Scroll to and select the SMOOTHNESS=####. Press *Enter•Yes*.
- The display reads KEEP=OLD NEW. Press *Enter•Yes* to complete the command (or *Cancel•No* to keep the original).

MIX, MERGE AND SPLICE

The mix, merge, and splice commands are very similar. You will always be working on a pair of Wavesamples—source and destination Wavesamples. These commands take a source WS and mixes, merges, or splices it into a destination WS. FR INST=## LYR=## WS=##, determines the source. TO INST=## LYR=## WS=## determines the destination. For best results the source and destination Wavesample should be in the same Instrument, in different Layers.

CONVERT SOURCE PITCH and CONVERT DEST PITCH let you combine Wavesamples that were sampled at different sample rates, or were on different root keys. If the Wavesamples are on the same root key, but have different sampling rates, their data will be different. The EPS can't simply add them together because they would be out of tune with each other. It has to convert the sample rate of one or the other.

Before executing these commands, you should assign the destination (or resulting) layer to one of the Patch Selects (on the EDIT/Instrument Page). That way, when you "audition" the sound after the commands have been executed, you can specifically hear the final results of the operation, and not the final results and the source Wavesample together. This process is similar to that described in copy Wavesample (pages 27 and 30).

NOTE:
When using the merge or splice commands, the volume balance function only lets you hear the relative volumes of the source and destination Wavesamples, not the final results. You will be able to hear the final results after the Wavesamples have been merged or spliced. Volume balance controls the relative volumes of the source and destination Wavesamples. When the value is negative, the source Wavesample is louder. And when the value is positive, the destination is louder.

2) MIX WAVESAMPLES

PURPOSE: Mix wavesamples is a lot like layering two Wavesamples. It adds the data of the two Wavesamples together. For example, to make a "bowed voice," you would assign the "bow" Wavesample to one Layer, then the "voice" Wavesample to a different Layer, and use "mix" to combine them digitally into one Wavesample.

- Press *Command*, then *Amp*. Select MIX WAVESAMPLES. Press *Enter•Yes*.
- The display reads ARE SAMPLES LAYERED? Press *Enter•Yes*.
- Select FR INST=## LYR=## WS=##.
- Scroll to TO INST=## LYR=## WS=##.
- Scroll to CONVERT SOURCE PITCH, or CONVERT DEST. PITCH. Press *Enter•Yes*.
- Scroll to VOLUME BALANCE=(-99 TO +99). Use the Data Entry Slider to set the balance between the two.
- Press *Enter•Yes*. The display then reads KEEP=OLD NEW. Press *Enter•Yes* to keep the mixed Wavesamples, or *Cancel•No* to keep the originals intact.

3) MERGE WAVESAMPLES

PURPOSE: Merge Wavesamples takes source wavedata, and cross fades it into destination wavedata. Merge Wavesamples has many of the same parameters as "mix," with the addition of scale depth and fade zone. The scale depth and fade zone operate the same as with the cross fade.

- Press *Command*, then *Amp*. Select MERGE WAVESAMPLES. Press *Enter•Yes*.
- The display reads ARE SAMPLES LAYERED? Press *Enter•Yes*.
- Select FR INST=## LYR=## WS=##. Scroll to TO INST=## LYR=## WS=##.
- Scroll to SCALE DEPTH=## DB. Scroll to FADE ZONE (PERCENT)=##.
- Scroll to CONVERT SOURCE PITCH or CONVERT DEST. PITCH.
- Scroll to VOLUME BALANCE=##. Press *Enter•Yes*.
- The display reads KEEP=OLD NEW. Press *Enter•Yes* to complete the command (or *Cancel•No* to keep the original).

4) SPLICE WAVESAMPLES

PURPOSE: This command takes the end of a source sample, and splices it to the beginning or start of the destination sample. SPLICE WAVESAMPLES is just like a tape splice—a butt splice. You can also think of it as "Merge" with a zero length fade zone.

- Press *Command*, then *Amp*. Select SPLICE WAVESAMPLES. Press *Enter•Yes*.
- The display will ask ARE SAMPLES LAYERED? Press *Enter•Yes.*
- Select FR INST=## LYR=## WS=##. Scroll to TO INST=## LYR=## WS=##.
- Scroll to CONVERT SOURCE PITCH. Scroll to CONVERT DEST. PITCH.
- Scroll to VOLUME BALANCE=-99 to +99 (see note on the previous page). Press *Enter•Yes.*
- The display reads KEEP=OLD NEW. Press *Enter•Yes* to complete the command (or *Cancel•No* to keep the original).

5) FADE IN

PURPOSE: To fade in wavedata. First, select a data range, using the start and end addresses, then choose an appropriate fade curve. 3 dB fades are very smooth and analogous to the way our hearing responds to sound.

- Press *Command*, then *Amp*. Select FADE IN. Press *Enter•Yes.*
- Select START ADDR=## (##). Scroll to END ADDR=## (##).
- Scroll to SCALE DEPTH=## DB. Press *Enter•Yes.*
- The display reads KEEP=OLD NEW.
- Press *Enter•Yes* to complete the command (or *Cancel•No* to keep the original).

6) FADE OUT

PURPOSE: To fade out wavedata. The parameters are the same as above.

- Press *Command*, then *Amp*. Select FADE OUT. Press *Enter•Yes.*
- Select START ADDR=## (##). Scroll to END ADDR=## (##).
- Scroll to SCALE DEPTH=## (##). Press *Enter•Yes.*
- The display reads KEEP=OLD NEW.
- Press *Enter•Yes* to complete the command (or *Cancel•No* to keep the original).

COMMAND/LFO PAGE

These are more Wavesample commands, but are accessed by pressing *COMMAND*, then *LFO*.

0) CLEAR DATA

PURPOSE: Use this when you want silence. Use the "start and end" addresses to select a section of Wavesample data you want to clear.

- Press *Command*, then *LFO*. Select CLEAR DATA. Press *Enter•Yes*.
- Select START ADDR=## (##). Scroll to END ADDR=## (##).
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).

1) COPY DATA

PURPOSE: Copy Data enables you to copy a section of data from one Wavesample into another Wavesample. Use the "start and end " addresses, to copy wavedata from a source to a destination. In fact, source and destination could be the same Wavesample, or the destination Wavesample could be in a different Instrument.

- Press *Command*, then *LFO*. Select, COPY DATA. Press *Enter•Yes*.
- Select FR INST=## LYR## WS=##. Scroll to START ADDR=## (##).
- Scroll to END ADDR=## (##). Scroll to TO INST=## LYR=## WS=##.
- Scroll to DEST ADDR=## (##). Press *Enter•Yes* to complete the command.

2) REPLICATE DATA

PURPOSE: The Replicate command is used when you want to append a section of wavedata to itself until the entire wavesample is filled. Set the data range with the "start and end" addresses.

- Press *Command*, then *LFO*. Select REPLICATE DATA. Press *Enter•Yes*.
- Select START ADDR=## (##). Scroll to END ADDR=## (##). Press *Enter•Yes*.
- The display reads KEEP=OLD NEW. Press *Enter•Yes* to complete the command.

3) REVERSE DATA

PURPOSE: Reverse Data ataD esreveR (it reverses data). It is the same as playing the sound backward.

- Press *Command*, then *LFO*. Select REVERSE DATA. Press *Enter•Yes*.
- Select START ADDR=## (##). Scroll to END ADDR=## (##).
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).

4) INVERT DATA

PURPOSE: This Command inverts the phase of the selected wavedata.

- Press *Command*, then *LFO*. Select INVERT DATA. Press *Enter•Yes*.
- Select START ADDR=## (##). Scroll to END ADDR=## (##).
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).

5) ADD DATA

PURPOSE: This Command is similar to "Copy Data," except it adds data, according to the source and destination range. It could be the same Wavesample, or a different one. When PREVENT CLIPPING is enabled, the EPS (if necessary) will scale down the destination and source data, so the added data doesn't result in clipping.

- Press *Command* , then *LFO*. Select ADD DATA. Press *Enter•Yes*.
- Select FR INST=## LYR=## WS=##. Scroll to START ADDR=## (##).
- Scroll to END ADDR=## (##). Scroll to TO INST=## LYR=## WS=##.
- Scroll to DEST ADDR=##(##). Scroll to PREVENT CLIPPING=(NO/YES). Press *Enter•Yes*.
- The display reads KEEP=OLD NEW. Press *Enter•Yes*, or *Cancel•No* to abort the procedure.

6) SCALE DATA

PURPOSE: This is a "sound sculpting" tool that will enable you to shape the volume contour of the waveform. As in the other commands, you select some range of data using the start and end addresses. You also set the scaling range with scale start and scale end points. These are multipliers. Scale start is a multiplier used at the beginning of the source range. Scale end is the multiplier used at the end of the source range. The question is, what happens if the two scale points are the same. That's like multiplying the whole range of data by the same number. So, if you wanted to drop the level in half, you would set scale start and end to 2.0. Scale depth works as described previously. If the scale points are different, the data will be scaled using a scaling curve whose depth is controlled by the scale depth.

- Press *Command*, then *LFO*. Select SCALE DATA. Press *Enter•Yes.*
- Select START ADDR=## (##). Scroll to END ADDR=## (##). Scroll to SCALE START=##.
- Scroll to SCALE END=##. Scroll to SCALE DEPTH=## DB. Press *Enter•Yes.*
- The display reads KEEP=OLD NEW. Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).

PITCH TABLES

Pitch tables let you specify the tuning of each note on the keyboard. Each EPS Instrument can have as many as eight different pitch tables, or different layers can share the same pitch table. To edit a pitch table for a specific Layer, make sure the Layer is selected on the EDIT page.

Here are some possible pitch table configurations. . .
- Layer 1—a grand piano (standard tuning).
- Layer 2—a copy of the grand piano (19-tone equal temperament).
- Layer 3—another copy of the grand piano (Pythagorean tuning), etc.

Memory consumption is not a problem, because each Layer can be a copy of Layer 1. Consider this: You can step through each tuning by using the patch select buttons, or you can configure each Layer to respond to a different velocity.

The EPS has two "built in" pitch tables, STANDARD and NO PITCH. These two are always available on the EDIT/Layer Page of any Instrument along with any other pitch tables you might create.
- PITCH TBL=STANDARD means that the layer will use a standard equi-tempered tuning.
- PITCH TBL=NO PITCH means that the layer will play the pitch at middle C across the entire keyboard.

You can't copy, delete or extrapolate these two pitch tables. If you try, you will get the message NO EDIT PITCH TABLE. You must create a new pitch table first using the EDIT PITCH TABLE command (see the following).

COMMAND/Pitch Page

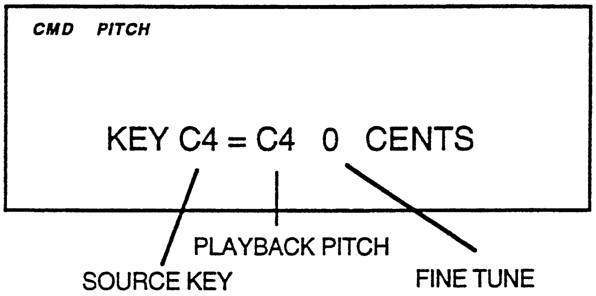
To execute the following commands, first press *Command*, then *Pitch.* You can then select the individual commands using a combination of the Arrow buttons.

0) EDIT PITCH TABLE

PURPOSE: To create or edit pitch tables.

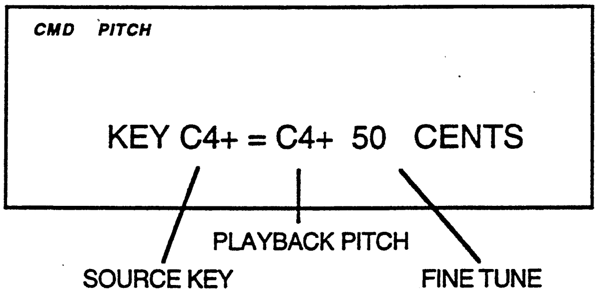
- Load your operating system and sample a sound. Pick C4 as the root key.
- Press *Command*, then *Pitch.*
- Select EDIT PITCH TABLE.
- Press *Enter•Yes.* The display reads CREATE NEW PITCH TBL?

- Press *Enter•Yes*. The display reads KEY E4 = * 0 CENTS. This is the default display. If you press any key on the keyboard the display will change.
- Press C4 on the keyboard. The display now looks like this...



The source key can be thought of as the physical location of the key on the keyboard. The playback pitch can be the same as the source key—as shown in the display—or it can be any pitch from A0 to C8. The range of the fine tune is 0 to 99 cents. This enables you to create micro-tunings. To do this—

- Play C4+ on the keyboard (the source key). Or, use the Up/Down Arrow buttons or the Data Entry Slider to select the source key.
- Underline 0 in the display (fine tune), and change that to 50 CENTS. The display now looks this...



You have just defined a new interval between C and C4+. That interval has now been stretched by 50 cents. Now that you've got a feel for changing note intervals, let's create a larger pitch table.

- Delete this sample from memory and create another one.
- Press *Command*, then *Pitch*. The display reads EDIT PITCH TABLE.
- Press *Enter•Yes*. The display reads CREATE NEW PITCH TBL?
- Press *Enter•Yes*. The display reads KEY E4 = * 0 CENTS. This is the default display.
- Play C4 on the keyboard. The display reads KEY C4 = C4 0 CENTS.
- Underline the second C4 in the display (playback pitch), and use the Data Entry Slider or Arrow buttons to change that to F4. The display should look like this: KEY C4 = F4 0 CENTS. If you play C4 on the keyboard it will play back the pitch from F4.

Let's continue...

- Move the cursor to the left and underline the source key position. The display reads KEY C4 = F4 0 CENTS.
- Play C4+ on the keyboard. This is the *new* source key. The display now reads KEY C4+ = C4+ 0 CENTS.
- Move the cursor to the right and underline the playback pitch position. Change the playback pitch to F4+. The display reads KEY C4+ = F4+ 0 CENTS.
- Move the cursor to the left and underline the source key position.
- Play D4 on the keyboard. The display reads KEY D4 = D4 0 CENTS.
- Move the cursor to the right and underline the playback pitch position. Change the playback pitch to G4. The display now reads KEY D4 = G4 0 CENTS.
- Press the Left Arrow button. The display reads TBL NAME=PITCHTABLE. This is the default name. We highly recommend you name your pitch tables for easy identification.
- Press *Enter•Yes*. This takes you back out to the EDIT PITCH TABLE page.
- Scroll to the EXTRAPOLATE PITCH TBL page.

- Press *Enter•Yes.* The display reads SOURCE LO=## HI=##. Make sure LO=## is underlined in the display, if it isn't already.
- Play C4 on the keyboard (remember, this was our original source key). The display reads SOURCE LO = C4 HI=##.
- Underline HI=## in the display and play D4. The display reads SOURCE LO=C4 HI=D4.
- Press *Enter•Yes.*

The EPS has now extrapolated these new intervals across the entire keyboard. In addition, we could have used fine-tuning to create anything from stretch tuning to micro-tonal tunings.

The copy, delete, and extrapolate pitch table commands all use the pitch table for the currently selected Layer. To determine if Layer has a pitch table:
- Press *Edit.* The display reads <INST NAME> LYR=1 WS=ALL. Select the Layer you want.
- Press *Layer.* Scroll to PITCH TBL=__. You can scroll through the available pitch tables by pressing the Up Arrow button. STANDARD and NO PITCH will always be here.

You can't copy, delete or extrapolate the STANDARD or NO PITCH pitch tables. If you try, you will get the message NO EDIT PITCH TABLE. You must create a new pitch table first using the EDIT PITCH TABLE command (see page 40).

1) COPY PITCH TABLE

PURPOSE: To copy an EDIT PITCH TABLE from one Layer to another within an Instrument or to another Instrument.

- Select COPY PITCH TABLE.
- Press *Enter•Yes.* The display reads TO INST=##.
- Press *Enter•Yes.* The display reads PITCH TABLE ## CREATED.

2) DELETE PITCH TABLE

PURPOSE: To erase/delete pitch tables.
- Select DELETE PITCH TABLE.
- Press *Enter•Yes.* The display reads COMMAND COMPLETED.

3) EXTRAPOLATE PITCH TABLE

PURPOSE: To project or extend pitch tables across the keyboard. In other words, you can take the intervals defined between any two keys, and extend that same relationship over the entire keyboard. See the above exercise for more on this.

- Select EXTRAPOLATE PITCH TBL.
- Press *Enter•Yes.* The display reads SOURCE LO=## HI=##. This determines the range of the extrapolation.
- Play the low key of the range you wish to extrapolate.
- Scroll right to underline HI=##.
- Play the high key of the range you wish to extrapolate.
- Press *Enter•Yes.* The display reads COMMAND COMPLETED.

EDIT/Instrument Page

The parameters on this page control the attributes of the individual Instrument. You must first press *Edit*, then *Instrument* before editing any Instrument parameters.

0) Patch (Layer Enable/Disable)

PURPOSE: To program a Layer—or combination of layers—to either play or not play depending on which Patch Select buttons are pressed. See page 13 of the *Musician's Manual* and the Tutorial on page 4 for an in-depth discussion of this parameter.

1) KEYDOWN LAYERS

PURPOSE: To determine which Layer(s) will be triggered when the keyboard is played.

- Select KEYDWN LAYERS=##. Use the cursor and the Up/Down Arrow buttons to select either a number (Layer enabled on keydown) or a dash (Layer disabled on keydown) for that location.

2) KEYUP LAYERS

PURPOSE: To determine which Layer(s) will be triggered when a key is released. A good example of this would be the "thunk" sound made by a harpsichord when you release a key. This release sound can be sampled separately and placed in a Layer which you designate as a key-up Layer. If you want a Layer to be triggered only when keys are released, be sure to turn that Layer off with the KEYDWN LAYERS parameter.

- Select KEYUP LAYERS=##. Use the cursor and the Up/Down Arrow buttons to select either a number (Layer enabled on keyup) or a dash (Layer disabled on keyup) for that location.

3) MIDI OUT CHANNEL

PURPOSE: To determine which MIDI channel the Instrument will transmit on *if* the "smart MIDI" parameter on the EDIT/MIDI Page is set to TRANSMIT ON=INST CHANNEL. Any of the 16 MIDI channels can be selected.

If the "smart MIDI" parameter is set to TRANSMIT ON=BASE CHANNEL, the EPS will only send on the Base MIDI channel (also selected on the EDIT/MIDI Page) no matter which MIDI channel is selected.

Also, if the Instrument has been assigned LOCAL status, it won't matter what MIDI channel you assign here—playing that Instrument will not send any MIDI information.

- Select MIDI OUT CHANNEL=##. Range: MIDI channels 1 through 16.

4) MIDI OUT PROGRAM

PURPOSE: To choose which program change number will be sent over MIDI when the Instrument is selected. If the Instrument has been assigned LOCAL status it won't matter what this parameter is set to because the Instrument won't send program changes.

- Select MIDI OUT PROGRAM=##. Range 1 through 128.

5) PRESSURE MODE

PURPOSE: If TRANSMIT=INST CHAN—selected from the EDIT/MIDI Page—then this parameter determines which type of pressure—channel or Poly-Key, or no pressure at all—will be transmitted over the Instrument's MIDI channel. If the Instrument is assigned LOCAL status, this determines what type of pressure (if any) it will respond to when you play the keyboard.

When PRESSURE=OFF:
- The Instrument will not send or receive pressure of either type over MIDI.
- Local voices played from the keyboard or the sequencer will not respond to pressure.
- The sequencer will not record pressure into any tracks you record. The sequencer will, however, play back pressure if it was previously recorded into a track.

You should select PRESS=OFF whenever you don't want or need pressure for a given Instrument, particularly when sequencing. Pressure eats up sequencer memory rapidly, so whenever you record a track, whether local or MIDI, with a sound that doesn't respond to pressure, set this parameter to OFF. This will avoid wasting valuable sequencer memory and also avoid clogging up the MIDI stream with a lot of unnecessary pressure information.

When PRESSURE=KEY:
- Local voices played from the EPS keyboard will respond to key pressure only.
- The sequencer will record key pressure into any tracks you record.
- The EPS will send only key pressure out via MIDI; however,
- Either channel pressure or Key pressure will be received via MIDI as it comes in.

When PRESSURE=CHAN:
- Local voices played from the EPS keyboard will respond to channel pressure only.
- The sequencer will record channel pressure into any tracks you record.
- The EPS keyboard will send only channel pressure out via MIDI, however.
- Either channel pressure or key pressure will be received via MIDI as it comes in.

At present, channel pressure is recognized by more MIDI devices than key pressure. If you are playing or sequencing an external MIDI device from the EPS and pressure doesn't seem to be having an effect, it could be the EPS is set to send key pressure and the receiving instrument only recognized channel pressure. In this case, set this parameter to PRESSURE=CHAN when playing or sequencing that instrument.

6) SEND KEYS TO (Local/MIDI/Both)

PURPOSE: To determine whether the Instrument will play LOCALLY (only on the EPS), or over MIDI, or both. There are three possible settings:

- Select SEND KEYS TO=BOTH. Keys, controllers, etc. will be played locally and also will be sent via MIDI when the Instrument is played from the keyboard or the sequencer.
- Select SEND KEYS TO=LOCAL. The Instrument will only play local voices, and will not send any data out MIDI.
- Select SEND KEYS TO=MIDI. Keys, controllers, etc. will be sent out via MIDI when the Instrument is played from the keyboard or the sequencer. The Instrument will not play EPS voices at all. This is comparable to Local Off on some keyboards. Use this status when you want to create MIDI-only Instruments/Tracks for playing or sequencing remote MIDI devices.

Note that these settings are in effect only when the "Smart MIDI Out" control on the EDIT/MIDI Page is set to TRANSMIT ON=INST CHANNEL.

7) SIZE (in Blocks)

PURPOSE: To determine how much internal memory the Instrument occupies. This is a readout only and can't be modified using the Data Entry Slider. Size is shown in *Blocks.* One Block=256 samples (or words). Four Blocks=1k sample/words.

When you want to know if there's enough room to save a particular Instrument to a particular disk, you can compare the Instrument size (shown here), to the FREE DISK BLOCKS shown on the EDIT/System Page.

- Select SIZE=## BLOCKS.

8) INST NAME

PURPOSE: You can use this parameter to change the name of an existing Instrument, or name a new one which you've just created. The display shows the twelve-character name of the Instrument with a cursor beneath the first character. Newly-sampled or created Instruments are called UNNAMED INST.

- Select NAME=####. Use a combination of the Arrow buttons to name/rename the Instrument.

EDIT/Layer Page

You must first press *Edit*, then *Layer* before editing any Layers.

0) Layer GLIDEMODE

PURPOSE: To create portamento glide between notes. This is a monophonic effect which is triggered when you play legato notes. When set to PEDAL, you must play legato notes (or sustained notes and depress the foot pedal to activate the glide).

- Select Layer GLIDEMODE=OFF/MONO/PEDAL.
- Layer GLIDEMODE=MONO enables monophonic voice assignment, allowing only one voice to be active in the Layer. If a key is depressed before another is released, the voice will glide from the old note to the new one.
- Layer GLIDEMODE=PEDAL enables sustain pedal activated polyphonic glide. In this mode, the glide is controlled by the sustain pedal. When the pedal is up, there is no glide and the Layer if fully polyphonic. When the sustain pedal is depressed, the glide is enabled and the polyphony is limited to the number of notes being sounded at the moment. For example, with the pedal up play a three note chord. Press the sustain pedal and lift your fingers off the keys (the three notes will sustain). Now press another key. One of these sustaining notes will glide to the new note, keeping a key down will prevent a note from being stolen. This allows controlled voice leading.

1) Layer GLIDETIME

PURPOSE: To set the speed of the glide. Lower values yield a faster glide; higher numbers, a slower glide.

- Select Layer GLIDETIME=##. Range: 0 to 127.

2) LEGATO Layer

PURPOSE: The legato Layer is an ENSONIQ innovation which enables the EPS to capture the elusive nuances of acoustic instruments. The sound of a wind instrument, the flute for example, is different when it is "tongued" than when notes are played in a connected manner (called legato). When two notes are "slurred" or "trilled" the characteristic attack of the second note is not present. The EPS allows a simulation of this effect when used in conjunction with one of the glide modes.

The rules for glide, described above, determine when two notes will be connected. The glide time determines how fast it will get to the new note. The legato Layer parameter selects which Layer, and therefore what sound, will play on the new note.

For example, suppose that Layer one is a flute sample with a tongued attack, and Layer two is a flute sustain without any attack. To use this function:

On the EDIT/Instrument Page:
- Enable both Layer 1 and the Layer 2 in the patch. The display reads 00 PATCH=1 2 - - - - - -.
- Enable Layer 1, the attack, as a keydown Layer. Disable Layer 2 as a keydown Layer. The display reads KEYDWN LAYERS=1 - - - - - - -.

On the EDIT/Layer Page for Layer 1:
- Set Layer GLIDEMODE=MONO.
- Set LEGATO Layer=2.
- Adjust GLIDETIME as you see fit.

3) Layer VEL LO; VEL HI

PURPOSE: To set the velocity range in which the layer will respond. Outside the range selected, the layer will not play. See page 6 for more about velocity and layers.

- Select LYR VEL LO=## HI=##. Ranges: 0 to 127.

4) PITCH TABLE

PURPOSE: To determine whether a Layer will use a standard (equitempered) pitchtable, or have middle C across the keyboard (no pitch), or will use any pitch table you create. See page 40 for more on creating and editing pitch tables.

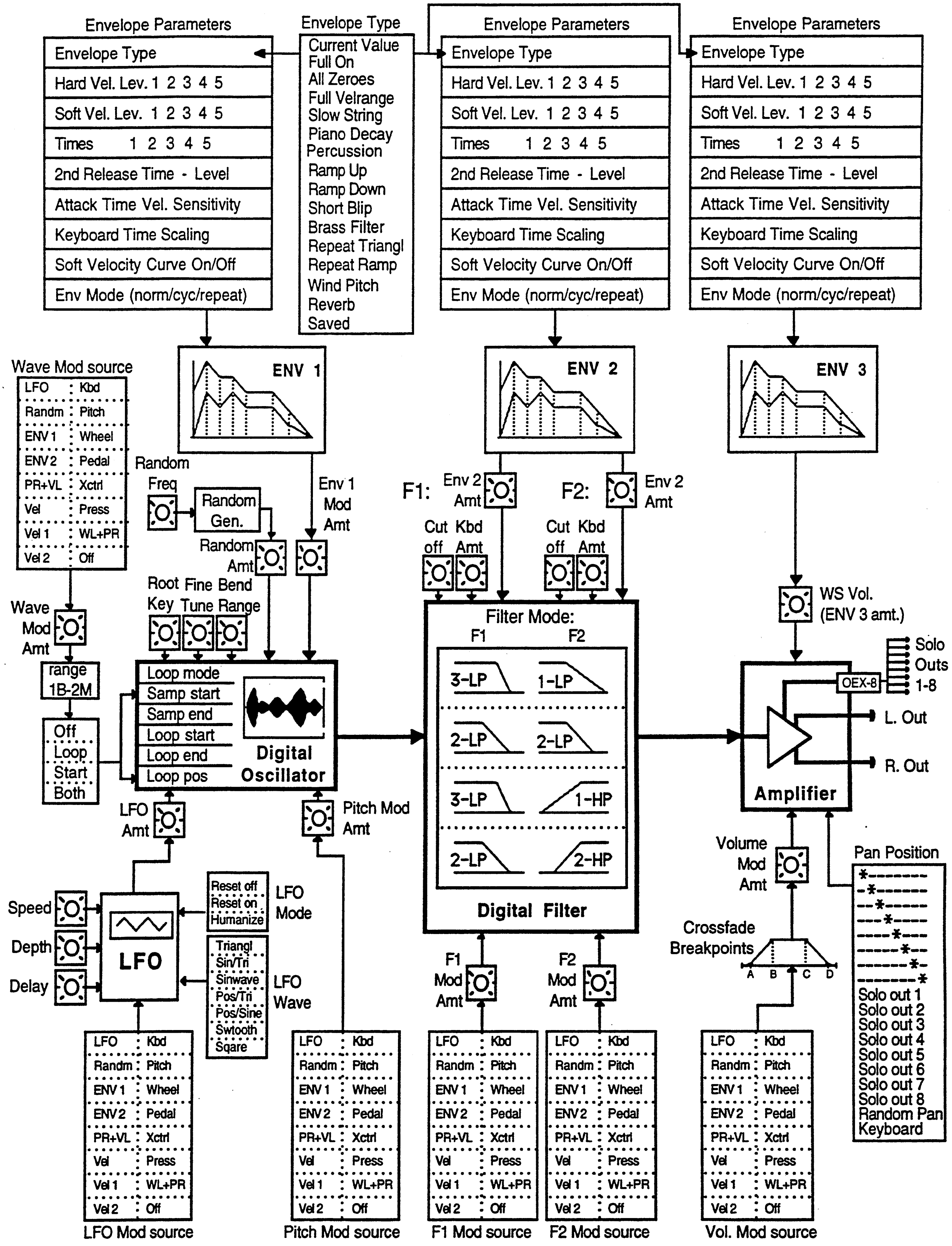
- Select PITCH TBL=STANDARD/NO PITCH.

5) Layer NAME

PURPOSE: To name or rename a Layer.

- Select L NAME=UNNAMEDLAYER. You can use the Arrow buttons to name your Layer.

EPS Wavesample Configuration



WAVESAMPLE PARAMETERS

On the following pages you will find the parameters that are contained in each Wavesample: Env 1, Env 2, Env 3, Filter, Pitch, Amp, LFO, and Wave. The diagram on page 47 shows the complete voice architecture of one EPS Wavesample. Referring to this diagram may clarify the way signals are routed within an EPS Wavesample.

ABOUT THE ENVELOPES

Each EPS Wavesample has three envelopes. These envelopes are "hard wired" to the pitch, filter frequency and amplitude of the Wavesample, though Env 1 and Env 2 can also be assigned elsewhere, wherever a modulator is selectable. The Page button for each of the three envelopes is directly above that of the function it's associated with:

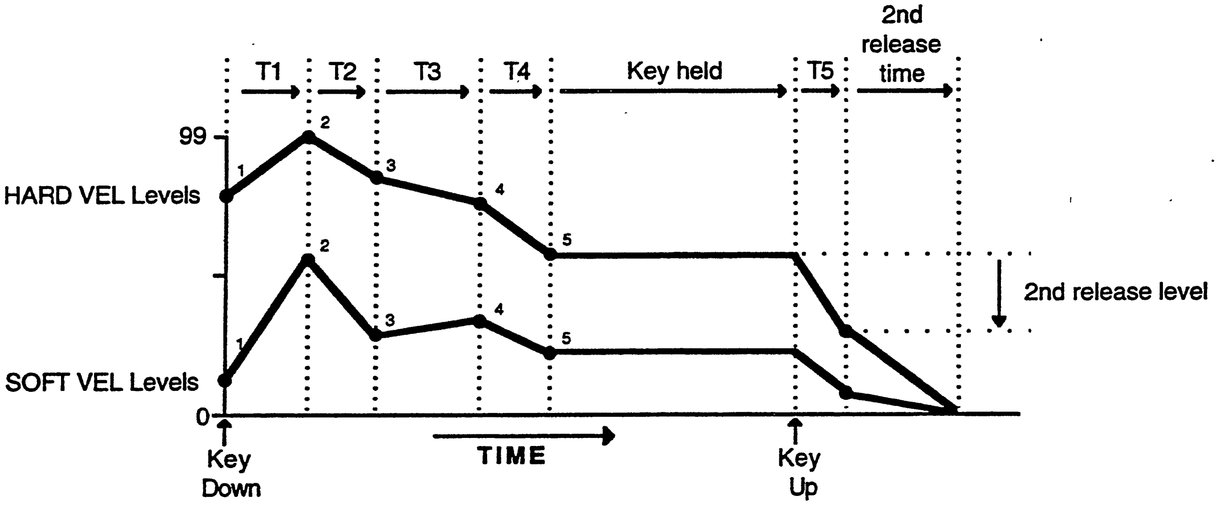
- Env 1 is routed to Wavesample pitch.
- Env 2 is routed to Wavesample filter frequency.
- Env 3 is routed to Wavesample amplitude (volume).

In the EPS, the response of the Wavesample volume, ENV 3, and the Instrument mix level all use the same (non-linear) response curve. As shown below, setting any of these volume controls to 50 will attenuate a sound by 16 decibels.

ENV 3:

HARD OR SOFT LEVEL	LEVEL AMPLITUDE RESPONSE (dB)
99	0
75	-8
50	-16
25	-32
6	-56
0	-∞

Whenever you are on one of the three Envelope Pages, the indicator lights in the display tell you which it is. For example when you are on the EDIT/Env 2 Page, the FILTER and ENV indicators are lit. The figure below shows a typical EPS envelope shape:



The EPS envelope is a descendant of the venerable ADSR (attack, decay, sustain, release) envelope, with a number of refinements. While the ADSR envelope gives you control over three times segments and one level, the EPS envelopes have six times and six levels.

What's more, the envelope parameters allow you to describe two entirely different shapes; one for maximum velocity (HARD VEL) and one for minimum velocity (SOFT VEL). When a key is struck, the envelope generator actually *interpolates* between the two.

EDIT/Env 1, Env 2, Env 3 Page

You must first press *Edit*, then either *Env 1*, *Env 2*, or *Env 3* before editing any Envelopes. See the EPS Wavesample Configuration Diagram on page 47.

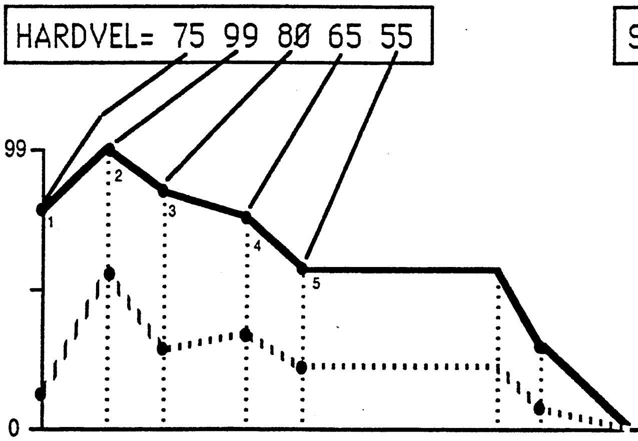
Each of the three Envelope Pages (EDIT/Env 1, EDIT/Env 2, and EDIT/Env 3) contains the following parameters:

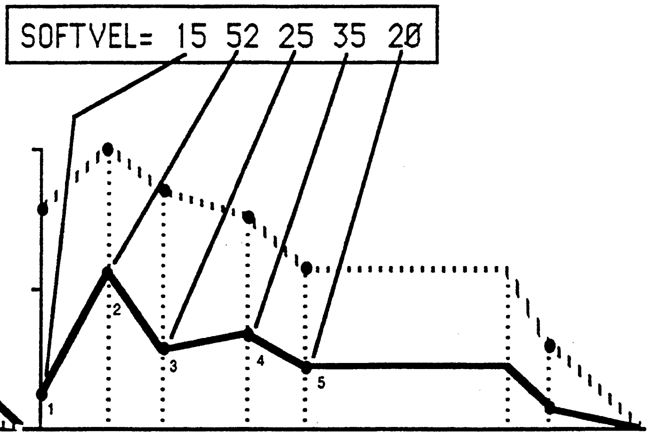
1) HARD VEL LEVELS

HARDVEL shows the 5 levels for the envelope used with maximum velocity. Level-1 is the initial level; in a traditional ADSR shape, Level-1 is always set to zero. Level-5 is the sustain level.

2) SOFT VEL LEVELS

SOFTVEL shows the 5 levels for the envelope used with minimum velocity.





3) TIMES

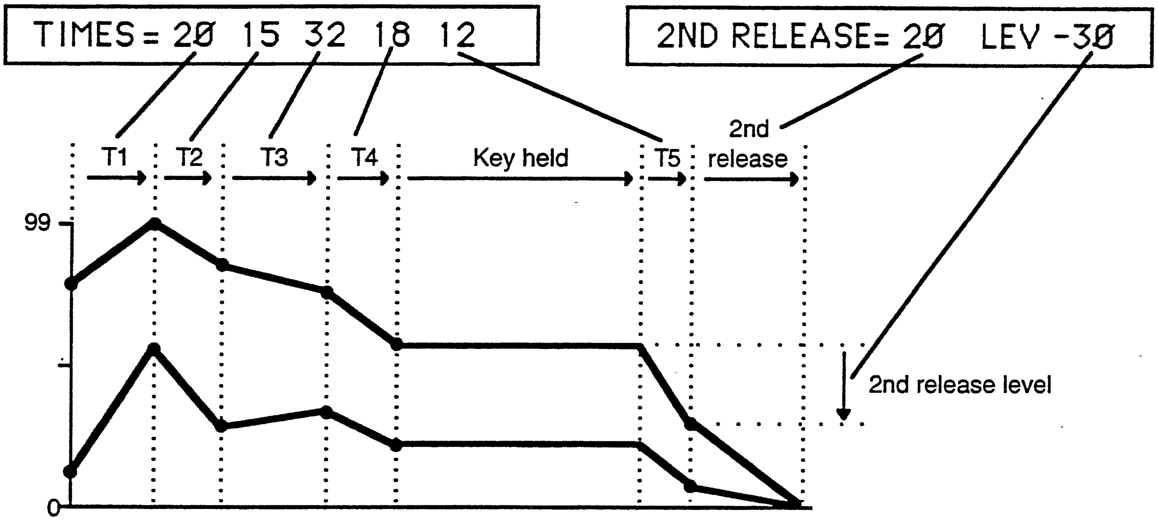
TIMES shows 5 time parameters. The first four are the times between the 5 levels. The fifth time is the (first) release time.

ENVELOPE TIMES

value	time (in sec)	value	time (in sec)	value	time (in sec)	value	time (in sec)	value	time (in sec)
0	.00	20	.20	40	.82	60	3.2	80	13
1	.01	21	.22	41	.88	61	3.5	81	14
2	.02	22	.23	42	.94	62	3.7	82	15
3	.03	23	.25	43	1.0	63	4.0	83	16
4	.04	24	.27	44	1.0	64	4.3	84	17
5	.06	25	.29	45	1.1	65	4.6	85	18
6	.07	26	.31	46	1.2	66	4.9	86	19
7	.08	27	.33	47	1.3	67	5.3	87	21
8	.08	28	.35	48	1.4	68	5.7	88	22
9	.09	29	.38	49	1.5	69	6.1	89	24
10	.10	30	.41	50	1.6	70	6.5	90	26
11	.11	31	.44	51	1.7	71	7.0	91	28
12	.11	32	.47	52	1.8	72	7.5	92	30
13	.12	33	.50	53	2.0	73	8.1	93	32
14	.13	34	.54	54	2.1	74	8.6	94	34
15	.14	35	.58	55	2.3	75	9.3	95	37
16	.15	36	.62	56	2.4	76	9.9	96	39
17	.16	37	.66	57	2.6	77	10	97	42
18	.17	38	.71	58	2.8	78	11	98	45
19	.19	39	.76	59	3.0	79	12	99	49

4) 2ND RELEASE TIME - 2ND RELEASE LEVEL

2ND RELEASE time and 2nd release LEVEL provide one more breakpoint in the envelope, which occurs *after* the release (T5). The LEVEL controls where the breakpoint will be placed *relative to the current value of the envelope* at the time the key was released.



5) ATTACK TIME VELOCITY SCALING

ATTACK TIME VEL makes time-1 shorter with increasing velocity.

6) KEYBOARD TIME SCALING

KBD TIME SCALING makes the envelope shorter for keys above the root key. Keys below the root key will have longer envelopes; the root key is not affected by this parameter. 2ND RELEASE TIME is not affected by this parameter.

7) SOFT VELOCITY CURVE (ON/OFF)

SOFT VEL CURVE switch, when off, makes the envelope use only the HARDVEL levels, regardless of the velocity.

8) ENVELOPE MODE

ENVELOPE Mode has three states:

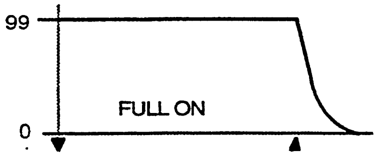
NORMAL: as pictured in the envelope diagrams above.
CYCLE: envelope runs its full cycle, ignoring the key-up event.
REPEAT: In this Mode, the envelope will run through levels 2 through 5, using times 1 through 4, repeatedly as long as the key is down.

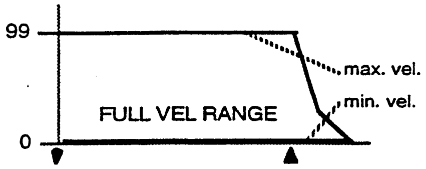
0) ENVELOPE TEMPLATES

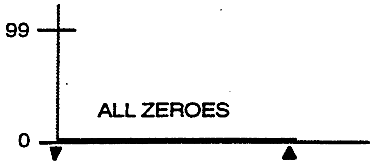
The last parameter on the envelope Page usually reads ENVELOPE=CURRENT VALUE. This is the envelope template parameter.

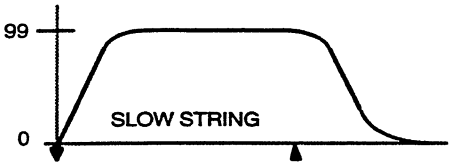
There are a number of "typical" envelopes permanently stored in the EPS; they each have a name. When you select one of these envelopes, its 21 parameters are *copied* into the envelope of the Wavesample or Wavesamples you are editing. The old values are temporarily saved as the CURRENT VALUE. You can go back to CURRENT VALUE any time you wish, unless you change any of the values in one of the template envelopes. Editing individual parameters of *any* envelope causes it to become the CURRENT VALUE of that particular envelope.

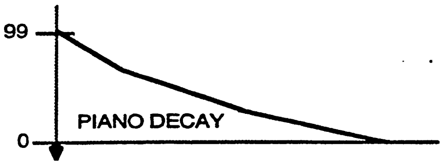
▼ = Key Down
▲ = Key Up

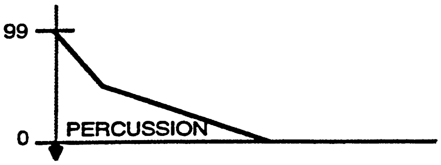


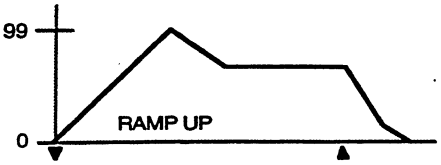


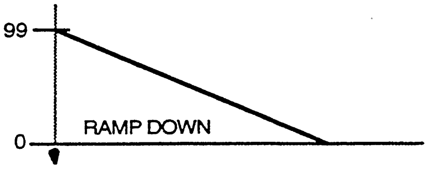


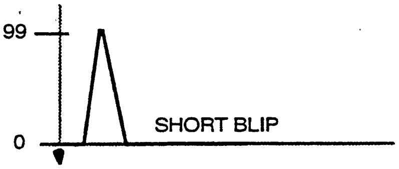


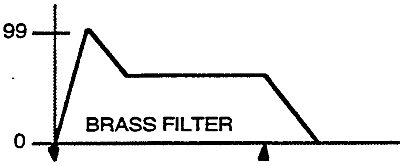


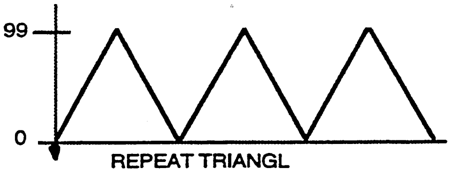


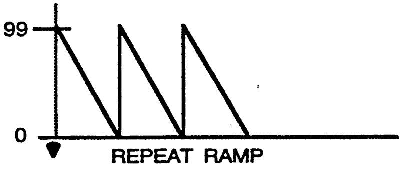


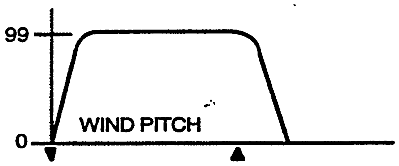


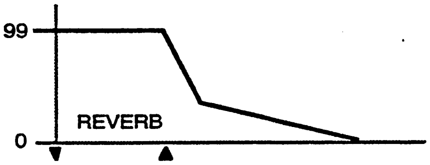












COPYING ENVELOPES

Pressing *Enter•Yes* while on the envelope template Page causes the current set of parameters to be saved in a special buffer. The message ENVELOPE PARAMETERS SAVED will appear briefly. There is only one SAVED envelope in the entire EPS at any one time. This envelope becomes your own template, which can be selected on the envelope template Page by selecting ENVELOPE=SAVED. You can use this function to copy an envelope from one Wavesample to another.

ABOUT FILTERS

Each voice of the EPS's 20 voices has its own pair of digital filters, F1 and F2, which are connected in series. The filter settings determine which frequencies will be allowed to pass through to the output.

1) LOW-PASS AND HIGH PASS

A low-pass filter allows only those frequencies below the filter cutoff frequency to pass—higher frequencies are filtered out. The reverse is true for the high-pass filters. In the EPS, the first filter (F1) is always a low-pass filter. The second filter (F2) can be either a high-pass or low-pass filter.

2) POLES: ROLLOFF CURVES

"Pole" is an engineering term which describes the steepness of a filter. Each additional pole gives a filter a steeper rolloff curve. In the EPS, four poles are available, but they are divided between two filters; either as 2 and 2, or as 3 and 1. A single-pole filter will rolloff at 6 dB per octave; a 2-pole, 12 dB per octave; a 3-pole, 18 dB per octave; and 4-pole, 24 dB per octave. To reproduce a 4-pole low-pass filter (for that "classic" analog synth sound) you would set both low-pass filters to roll off at 12 dB per octave, resulting in a 24 dB per octave rolloff.

3) CUTOFF FREQUENCY

Every filter has a "knee" in the response curve, known as the cutoff frequency. The filter cutoff frequency can remain fixed over time, or it can be varied by modulating the filter with an envelope, LFO, velocity, etc. You can create some very interesting filter configurations by using a different modulator for each filter. For instance, try using pressure to modulate the filter. You can drive one filter up with pressure, while simultaneously driving the other down.

EDIT/Filter Page

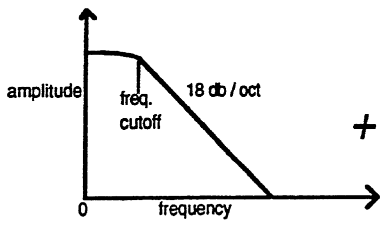
To select the following parameters, first press *Edit*, then *Filter*. See the EPS Wavesample Configuration Diagram on page 47.

0) MODE (Filter Mode)

PURPOSE: To choose one of the four filter modes.

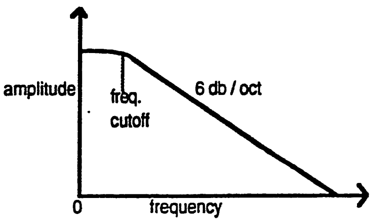
On the left are the response curves of the two filters shown separately. On the right are some of the possible shapes of the combined filters.

- Select MODE F1=3/LP F2=1/LP. F1 is a 3 pole low-pass filter. F2 is a 1-pole low-pass filter.



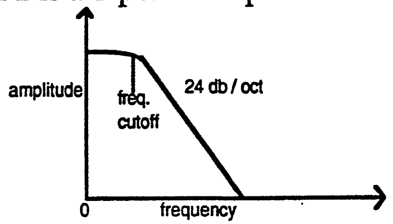
Filter 1 = 3 pole / Low-pass

+



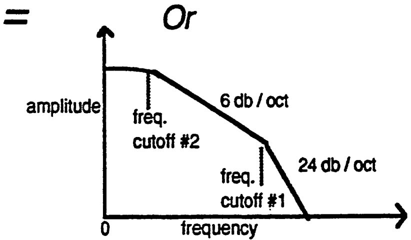
Filter 2 = 1 pole / Low-pass

=



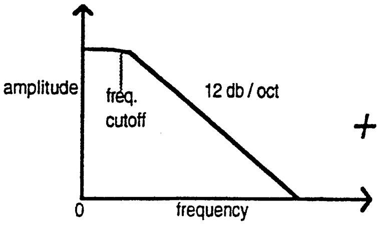
4 pole / Low-pass

Or



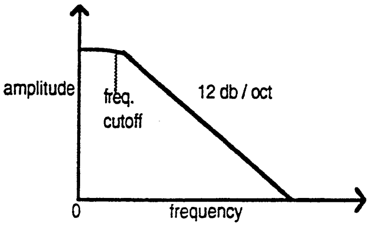
4 pole / Low-pass

- Select MODE F1=2/LP F2=2/LP. F1 is a 2-pole low-pass filter. F2 is also a 2-pole low-pass filter.



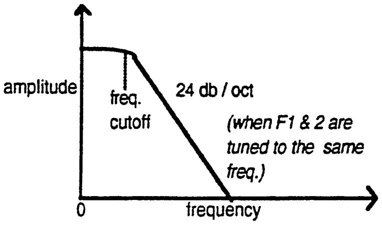
Filter 1 = 2 pole / Low-pass

+



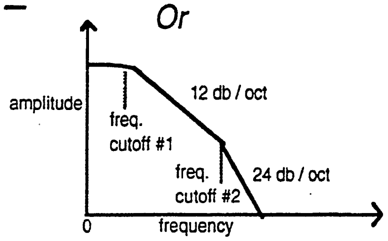
Filter 2 = 2 pole / Low-pass

=



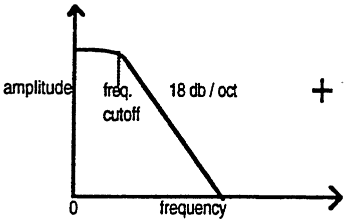
4 pole / Low-pass

Or



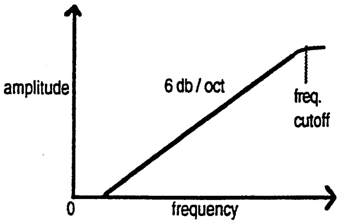
4 pole / Low-pass

- Select MODE F1=3/LP F2=1/HP. F1 is a 3-pole low-pass filter. F2 is a 1-pole high-pass filter.



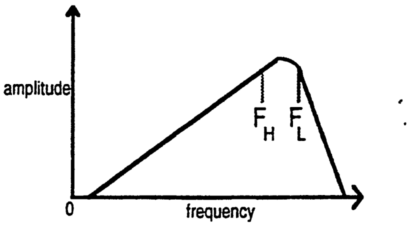
Filter 1 = 3/LP

+



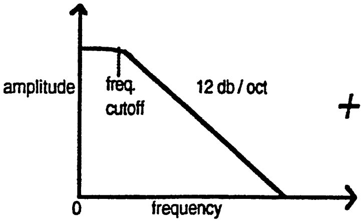
Filter 2 = 1/HP

=



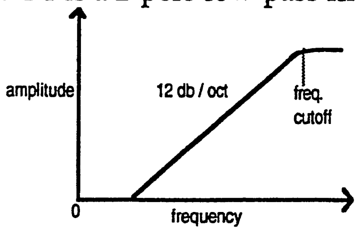
Bandpass

- Select MODE F1=2/LP F2=2/HP. F1 is a 2-pole low-pass filter. F2 is a 2-pole high-pass filter.



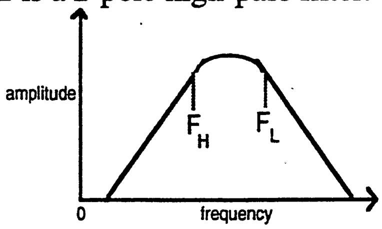
Filter 1 = 2 pole / Low-pass

+



Filter 2 = 2 pole / High-pass

=



Bandpass

1) F1 CUTOFF FREQ - F2 CUTOFF FREQ

PURPOSE: To set the initial filter cutoff frequency. With a low-pass filter, a setting of 127 lets all the original signal pass through the filter. With a high-pass filter, a setting of 0 lets all the original signal through. This setting represents the "filter floor." The effect of any selected modulators will be added to (or subtracted from) this level.

- Select CUTOFF F1=## F2=##. Ranges: 0 to 127.

2) F1 ENV 2 AMOUNT - F2 ENV 2 AMOUNT

PURPOSE: To set the depth or amount by which Env 2 will modulate the filters. Modulation amounts can be positive or negative.

- Select ENV 2 AMT F1=## F2=##. Ranges: -99 to +99.

3) F1 KBD AMOUNT - F2 KBD AMOUNT

PURPOSE: To set the amount by which the location of a note on the keyboard will modulate the filter cutoff frequency (keyboard filter tracking). This allows the relative brightness of a sound to remain constant over the keyboard. To track the keyboard exactly you should set KBDAMT to +50. Ranges: -99 to +99.

7) F1 MOD; F1 MOD AMOUNT

PURPOSE: To assign modulators to the filters.

- Select F1 MOD=## * ##. The filters can be modulated by the following: LFO, RANDM, ENV1, ENV2, PR+VL, VEL, VEL1, VEL2, KBD, PITCH, WHEEL, PEDAL, XCTRL, PRESS, WL+PR, OFF. Modulation amounts can be positive or negative. Range: -99 to +99.

8) F2 MOD; F2 MOD AMOUNT

PURPOSE: To assign modulators to the filters.

- Select F2 MOD=## * ##. The filters can be modulated by the following: LFO, RANDM, ENV1, ENV2, PR+VL, VEL, VEL1, VEL2, KBD, PITCH, WHEEL, PEDAL, XCTRL, PRESS, WL+PR, OFF. Modulation amounts can be positive or negative. Range: -99 to +99.

EDIT/Pitch Page

To select the following EDIT/Pitch parameters, first press *Edit*, then *Pitch*. See the EPS Wavesample Configuration Diagram on page 47.

1) ROOT KEY - FINE (Fine Tune)

PURPOSE: To select a root key and adjust its fine tuning.

- Select ROOT KEY=## FINE=##. Root key range: A0 to C8. Fine tune range: -99 to +99 cents.

2) LFO AMOUNT

PURPOSE: To set the amount by which the LFO will affect pitch (for vibrato, tremolo, etc).

- Select LFO AMOUNT=##. Range: -15.7 to +15.7 semitones.

3) ENV 1 AMOUNT

PURPOSE: To set the amount by which ENV 1 will affect pitch.

- Select ENV AMOUNT=##. Range: -15.7 to +15.7 semitones.

5) RANDOM FREQ - RANDOM AMOUNT

PURPOSE: Random is a noise generator. Its main use is to randomize/"humanize" the pitch. However, you can use it to modulate the filters, amplitude, etc. Random amount determines the depth of the modulation.

- Select RANDOM FREQ=## AMT=##. Random frequency range: 0 to 99. Amount: -99 to +99.

6) PITCH BEND RANGE

PURPOSE: To set the pitch bend range on the Wavesample level. The default value is two semitones.

- Select BEND RANGE=##. Range: 0 through 12 semitones. When BEND RANGE=GLOBAL the Wavesample's bend range will default to the global setting on the EDIT/System page.

7) PITCH MOD - PITCH MOD AMOUNT

PURPOSE: To assign one of 15 modulators to the pitch of the oscillator, and to set the amount (depth) of that modulator.

- Select PITCH MOD=## * ##. Modulators include: LFO, RANDM, ENV1, ENV2, PR+VL, VEL, VEL1, VEL2, KBD, PITCH, WHEEL, PEDAL, XCTRL, PRESS, WL&PR, OFF. Range: -99 to +99.

EDIT/Amp Page

The parameters on this page control the amplitude (or volume) of the Wavesample. You must first press *Edit*, then *Amp* to select any of these parameters. See the EPS Wavesample Configuration Diagram on page 47.

1) WS VOLUME

PURPOSE: To set the volume of an individual Wavesample. Range: 0 to 99.

- Select WS VOLUME=##. Range: 0 to 99.

2) PAN

PURPOSE: To assign a Wavesample to one of eight possible locations in the stereo field; or to assign a Wavesample to any of eight solo out locations (optional OEX-8 expander required); or to select random panning, or panning according to the wavesample's keyboard assignment. For more on panning see page 8.

- Select PAN= - - - * - - - -. Use the Up/Down Arrow buttons to select the different the pan parameters.

A WORD ABOUT THE OPTIONAL OEX-8 EXPANDER

The OEX-8 enables you to assign Instruments, Wavesamples, or Layers to any of the eight solo outputs, including the EPS's left/right stereo outs, for as many as ten simultaneous outputs.

VOLUME MODULATOR CROSS FADE BREAK POINTS
3) A-B FADE IN
4) C-D FADE OUT

PURPOSE: The cross fade break points (A, B, C, and D) allow you to scale the effect of the volume modulator (selected in #7 below), to create keyboard, velocity or other types of cross fades. See pages 6 and 7 for more on A-B FADE IN and C-D FADE OUT.

- Select A-B FADE IN=## ##. Ranges: 0 to 127.
- Select C-D FADE OUT=## ##. Ranges: 0 to 127.

7) VOLUME MOD - VOLUME MOD AMOUNT

PURPOSE: To assign a modulator to control the volume of an Instrument, Layer, and/or Wavesample. For more on volume modulation see pages 7 and 8.

- Select VOLUME MOD=## * ##. Volume modulators include: LFO, RANDM, ENV1, ENV2, PR+VL, VEL, VEL1, VEL2, KBD, PITCH, WHEEL, PEDAL, XCTRL, PRESS, WL+PR, OFF. Range: 0 to 99.

EDIT/LFO Page

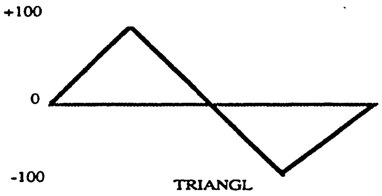
The parameters on this page control the Low Frequency Oscillator (LFO) which can be used to create vibrato, tremelo and other effects. You must first press *Edit*, then *LFO* to select any of these parameters. See the EPS Wavesample Configuration Diagram on page 47.

1) LFO WAVE

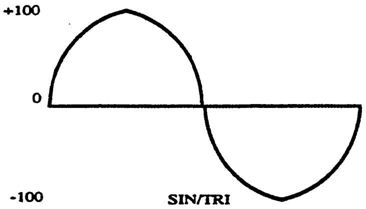
PURPOSE: To select an LFO waveform.

- Select WAVE=(TRIANGL, SIN/TRI, SINWAVE, POS/TRI, POS/SIN, SWTOOTH, or SQUARE).

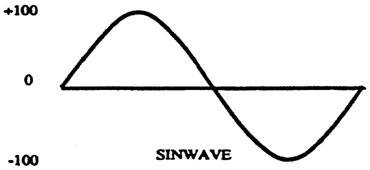
TRIANGL—the triangle wave is commonly used to modulate the LFO to produce vibrato.



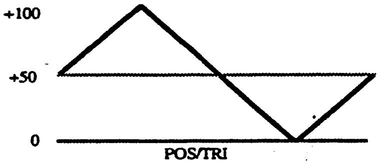
SIN/TRI—a mixture of a sine and triangle wave.



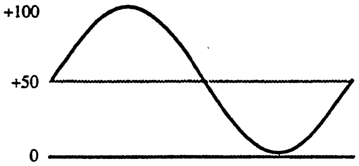
SINWAVE—the fundamental waveform consisting of a single frequency out of which all other waveforms are constructed.



POS/TRI—a waveform unique to the EPS, the POS/TRI is a positive-only triangle wave useful for simulating vibrato on instruments like the guitar where vibrato techniques can only bend the note up.

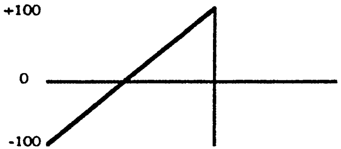


POS/SIN—another EPS exclusive waveform, the POS/SIN is similar in application to the POS/TRI.



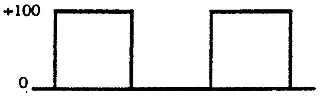
POS/SIN

SWTOOTH—the sawtooth wave is commonly used for special effects.



SWTOOTH

SQUARE—the square wave is useful for producing trill effects.



SQUARE

2) SPEED

PURPOSE: To set the speed of the LFO.

- Select SPEED=(0 to 99).

LFO FREQUENCIES

value	time (in Hz)	value	time (in Hz)	value	time (in Hz)	value	time (in Hz)	value	time (in Hz)
0	.05	20	1.25	40	6.25	60	11.25	80	16.25
1	.05	21	1.50	41	6.50	61	11.50	81	16.50
2	.06	22	1.75	42	6.75	62	11.75	82	16.75
3	.06	23	2.00	43	7.00	63	12.00	83	17.00
4	.06	24	2.25	44	7.25	64	12.25	84	17.25
5	.07	25	2.50	45	7.50	65	12.50	85	17.50
6	.07	26	2.75	46	7.75	66	12.75	86	17.75
7	.08	27	3.00	47	8.00	67	13.00	87	18.00
8	.08	28	3.25	48	8.25	68	13.25	88	18.25
9	.09	29	3.50	49	8.50	69	13.50	89	18.50
10	.10	30	3.75	50	8.75	70	13.75	90	18.75
11	.11	31	4.00	51	9.00	71	14.00	91	19.00
12	.13	32	4.25	52	9.25	72	14.25	92	19.25
13	.14	33	4.50	53	9.50	73	14.50	93	19.50
14	.17	34	4.75	54	9.75	74	14.75	94	19.75
15	.20	35	5.00	55	10.00	75	15.00	95	20.00
16	.25	36	5.25	56	10.25	76	15.25	96	20.25
17	.33	37	5.50	57	10.50	77	15.50	97	20.50
18	.50	38	5.75	58	10.75	78	15.75	98	20.75
19	1.0	39	6.00	59	11.00	79	16.00	99	21.00

3) LFO DEPTH

PURPOSE: To set the depth of the LFO. Depth controls the initial amount of LFO. The effect of any LFO modulator (#7 below) will be added to this amount.

- Select LFO DEPTH=(0 to 99).

4) DELAY
PURPOSE: To set delay of the LFO. Delay controls when the LFO will start. This is useful for creating delayed vibrato, tremolo, etc.

- Select DELAY=(0 to 99).

5) LFO MODE
PURPOSE: To set the LFO in one of three modes: When set to RESET OFF, the LFO will cycle continuously without resetting. When set to RESET ON, the LFO waveform will return to the beginning of its cycle each time a new key is struck. When set to HUMANIZE, the LFO will speed up and slow down randomly, making it possible to add a "human" quality to sounds.

- Select LFO MODE=(RESET OFF, RESET ON, or HUMANIZE).

7) LFO MOD
PURPOSE: To select a modulation source for LFO DEPTH. The effect of LFO MOD is *added* to the effect of the LFO DEPTH parameter. Either parameter can trigger the LFO. If you have the LFO DEPTH set to zero, you can still get LFO modulation by using any of the modulation sources on this page.

- Select LFO MOD=##. Modulation sources include: LFO, RANDM, ENV1, ENV2, PR+VL, VEL, VEL1, VEL2, KBD, PITCH, WHEEL, PEDAL, XCTRL, PRESS, WL+PR, OFF.

EDIT/Wave Page

To select the following EDIT/Wave parameters, first press *Edit*, then *Wave*. See the EPS Wavesample Configuration Diagram on page 47.

0) MODE (WS Playback Mode)
PURPOSE: To select one of five possible Wavesample playback modes.

- Select MODE=FORWARD—NO LOOP. The EPS plays through the Wavesample once (also known as "one shot" mode).
- Select MODE=BACKWARD—NO LOOP. The EPS plays through Wavesample once, only in reverse, from sample end to sample start.
- Select MODE=LOOP FORWARD. The EPS will play forward from sample start and will continue playing the loop while the key is depressed. Once the key is released the loop continues playing as the Wavesample envelopes away (also known as "one shot" mode).
- Select MODE=LOOP BIDIRECTION. The EPS will play forward from sample start. At loop end, the EPS will play the Wavesample in reverse to the loop start, playing the loop section back and forth until the key is released.
- Select MODE=LOOP AND RELEASE. The EPS will play forward from sample start and will continue playing the loop while the key is depressed. As soon as the key is released the EPS will go into "one shot" mode from wherever it is and will keep playing until the end of the Wavesample, playing data after the loop.

1) SAMPLE START
PURPOSE: To determine the sample start point. See page 25 of the *Musician's Manual.*

- Select SMPL START=## (##).

2) SAMPLE END
PURPOSE: To determine the sample end point. See page 25 and 26 of the *Musician's Manual.*

- SAMPLE END=## (##).

3) LOOP START
PURPOSE: To determine the loop start point. See page 26 of the *Musician's Manual.*

- Select LOOPSTART=## (##).

4) LOOP END
PURPOSE: To determine the loop end point. See page 26 of the *Musician's Manual.*

- Select LOOPEND=##.## (##).

5) LOOP POSITION
PURPOSE: This displays LOOP START but moves both LOOP START and LOOP END. It lets you search for the perfect loop after you have tuned the loop.

- Select LOOPPOS=## (##).

7) WAVE MOD TYPE
PURPOSE: To select a wave modulation type and modulation source. There are three types of wave modulation LOOP, START, and BOTH, and fifteen modulation sources: LFO, RANDM, ENV 1, ENV 2, PR+VL, VEL, VEL 1, VEL 2, KBD, PITCH, WHEEL, PEDAL, XCTRL, PRESS, WL+PR.

Here are some possible configurations:

- Select MOD=LOOP SOURCE=PRESS (pressure will modulate the loop pointers).
- Select MOD=START SOURCE=VEL (velocity will modulate the sample start pointers).
- Select MOD=BOTH SOURCE=WHEEL (changes in the mod wheel will modulate both the sample start and loop pointers).

8) WAVE MOD AMOUNT
PURPOSE: To set the amount of wave modulation. If you were working with a very small sample you would adjust the wave modulation amount to something like this MOD AMT=+99 RANGE 128 B. If you were working with a much larger sampler you would adjust the wave modulation to MOD AMT=+99 RANGE=1 MG. Think of RANGE as a multiplier, and MOD AMT=-99 TO +99 as fine tuning.

- MOD AMT=(-99 to +99) RANGE= (1 B (byte) to 2 MG (megabytes)).

COMMAND/Seq•Song Page

To execute the following commands, first press *Command*, then *Seq•Song*.

0) CREATE NEW SEQUENCE

PURPOSE: To create a new sequence. See page 36 in the *Musician's Manual* for information on creating a sequence.

1) COPY SEQUENCE

PURPOSE: To copy an entire sequence, including all tracks and parameters in the sequence. Copy sequence lets you perform commands and edits on the "copy" while preserving the source sequence.

- Select COPY SEQUENCE.
- Press *Enter•Yes*. The display reads FROM SEQ=SEQUENCE ##. Choose your source sequence.
- Press *Enter•Yes*. The display reads NEW NAME SEQUENCE. You can use the Arrow buttons to change the name of the sequence, or use the default designation.
- Press *Enter•Yes* to complete the command.

2) DELETE SEQUENCE

PURPOSE: To erase unwanted sequences.

- Select DELETE SEQUENCE.
- Press *Enter•Yes*. The display reads SEQ=SEQUENCE ##.
- If this is the sequence you want to delete, press *Enter•Yes*.

3) SAVE CURRENT SEQUENCE

PURPOSE: To save the current sequence to disk.

- Make sure the sequence you want to save is selected.
- Select SAVE CURRENT SEQUENCE.
- Press *Enter•Yes*. The display reads NEW NAME=SEQUENCE ##. If you want to rename your sequence, this is the time.
- Press *Enter•Yes*. The display reads SAVING SEQUENCE ##, then DISK COMMAND COMPLETED.

4) SAVE SONG + ALL SEQS

PURPOSE: To save all sequencer memory to disk as a file.

- Select SAVE SONG + ALL SEQS.
- Press *Enter•Yes*. The display reads NEW NAME=–**SONG**. You can change the song name at this point.
- Press *Enter•Yes*. The display reads SAVING–**SONG** then DISK COMMAND COMPLETED.

5) RENAME SONG/SEQUENCE

PURPOSE: To rename the the current sequence or song.

- Make sure the song, or the sequence you want to rename, is selected.
- Select RENAME SONG\SEQUENCE.
- Press *Enter•Yes*. The display reads NEW NAME=SEQUENCE ##. Use the Arrow buttons to rename the current sequence.
- Press *Enter•Yes* to complete the command.

6) SEQUENCER INFORMATION

PURPOSE: You can use this command to find out the length of the sequence (in bars), the time signature, the size of all sequencer data, and the size of the current sequence. In addition, you can keep track of the duration of the current sequence in minutes, seconds, and fractions of a second. If a song is currently selected, an additional parameter will be displayed which is MIDI SONG SELECT=##. The song can be assigned a MIDI number from 0 through 127. MIDI numbers 1 through 127 are transmitted over MIDI and are stored with the song when you save the song to disk. When MIDI SONG SELECT=0, the parameter is effectively turned off.

NOTE: This page is for information *only*. You cannot change any of the parameters from this page.

- Select SEQUENCER INFORMATION.
- Press *Enter•Yes*. The display reads SEQ LENGTH =## BARS.
- Scroll to TIME SIGNATURE=##. The time signature was defined when the sequence was being created, and is not adjustable with this parameter.
- Scroll to ALL SEQ DATA=## BLKS.
- Scroll to SEQUENCE ## = ## BLKS.
- Scroll to TIME=## MIN ## SEC.
- Scroll to MIDI SONG SELECT=## (if the song is currently selected).

7) ERASE SONG + ALL SEQS

PURPOSE: To clear all sequencer memory. Save to disk all sequences that are important to you before performing this command.

- Select ERASE SONG + ALL SEQS.
- Press *Enter•Yes*. The display reads ERASE ALL SEQ DATA?
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).

8) APPEND SEQUENCE

PURPOSE: To take a sequence and "attach" it to the end of another sequence. You can also append a sequence to itself to make a looping sequence. For example, if you have a drum sequence that's four bars long, you could append it to itself to create an eight bar sequence. Do it again and you have a sixteen bar sequence. The sequence to be appended must have the same time signature as the selected sequence.

- Select APPEND SEQUENCE.
- Press *Enter•Yes*. The display reads FROM SEQ=SEQUENCE ##. This is the source sequence.
- Press *Enter•Yes*. The display reads TO SEQ=SEQUENCE ##. This is the destination sequence.
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).

9) CHANGE SEQUENCE LENGTH

PURPOSE: To add bars to or delete bars from a sequence.

- Select CHANGE SEQUENCE LENGTH.
- Press *Enter•Yes*. The display reads ADD ## BARS AT ##.
  If, for example, you wanted to add 2 bars to your sequence starting at bar 4, adjust the display to look like this: ADD 2 BARS AT 4
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).
- Or, you can underline ADD in the display and use the Up Arrow button to change it to DELETE. You can now delete specific bars from the sequence using the procedure above.
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).

- EDIT SONG STEPS

PURPOSE: See page 41 of the *Musician's Manual* for a description of EDIT SONG STEPS.

COMMAND/Track Page

To execute the following commands, first press *Command*, then *Track*. You can then select the individual commands using the Arrow buttons.

0) QUANTIZE TRACK

PURPOSE: To "auto-correct" the timing of a track. After you have recorded a track, the EPS can post-quantize the track and will move the notes to the nearest beat boundary. For example, if you set quantize to 1/4, all the notes will be adjusted to the nearest quarter note. You can compare the quantized track with the original track on the KEEP=OLD NEW Page, before deciding whether to keep the results.

- Select QUANTIZE TRACK.
- Press *Enter•Yes*. The display reads TRACK=##. Select the track you want to quantize by pressing one of the active Instrument•Track buttons.
- Press *Enter•Yes*. The display reads BAR ## through BAR ##. By selecting the bar range here, you can quantize a single bar in a track, several bars in a given range, or the complete track.
- Press *Enter•Yes*. The display reads QUANTIZE TO ##. The quantize values are: 1/4, 1/4T (triplets), 1/8, 1/8T, 1/16, 1/16T, 1/32, 1/32T, 1/64, 1/64T. Select a quantize value.
- Press *Enter•Yes*. The display reads KEEP=OLD NEW. Press *Play*, and use the Left and Right Arrow button to compare the NEW quantized track to the OLD unquantized track.
- Press *Enter•Yes* if you want to keep the quantized version of the track, or *Cancel•No* to keep the unquantized track.

1) COPY TRACK

PURPOSE: To make a copy of any bar range of a track onto another track. You could double an existing track and then use a different sound; transpose the copy up or down by as much as an octave, or assign a new MIDI channel, etc.

- Select COPY TRACK.
- Press *Enter•Yes*. The display reads FROM SEQ=SEQUENCE ##. Use the Up/Down Arrow buttons to select a source sequence.
- Press *Enter•Yes,* or scroll right to select FROM TRACK=##. Select the source track by pressing one of the active Instrument•Track buttons. In this command the source track is the current track.
- Scroll right to select BAR ## through BAR ##. Choose a bar range here.
- Scroll right to TO SEQ=SEQUENCE ##. This is the destination sequence. It is not selectable because the destination sequence, in this case, is the current sequence.
- Scroll right to select TO TRACK=##. Choose a destination track by pressing one of the active Instrument•Track buttons.
- Scroll right to select AT BAR=##.
- Press *Enter•Yes*. The display reads KEEP=OLD NEW.
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).

2) ERASE/UNDEFINE TRACK

PURPOSE: Simply to erase a selected track. Keep in mind, even if you delete an Instrument from an Instrument•Track location, track data is still there until you undefine it. You can determine whether a track is defined by pressing *Edit*, then *Track*. Scroll to the SEQ ST page. An asterisk indicates that a track is undefined.

- Select ERASE/UNDEFINE TRACK.
- Press *Enter•Yes*. The display reads TRACK=##. Select the track you want to erase by pressing one of the active Instrument•Track buttons.
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).

3) ERASE CONTROLLER

PURPOSE: To remove controller information from any bar range of any track. Controllers such as the pitch, and modulation wheels—and especially pressure— consume memory much faster than key events. If you've just recorded a good track, but dislike the pitch bends, you could erase the pitch bend information from the entire track or certain bars in the track. You could then go back and overdub only the pitch bends using RECORD MODE=ADD under the EDIT/Seq•Song Page. If you decide to erase controller information completely, the available memory will be increased.

- Select ERASE CONTROLLER.
- Press *Enter•Yes*. The display reads TRACK=##. Select the track which contains the controller you want to erase.
- Press *Enter•Yes*. The display reads BAR ## THRU BAR ##. You can erase a controller within any bar in the track.
- Select ERASE=## ##. If you scroll through this page, you will see the various controllers which can be erased: PITCH WHEEL, MOD WHEEL, PATCH SELECTS, XCTRL (external controller), PEDAL, VOLUME, SUSTAIN, MONO PRESSURE.
- Press *Enter•Yes*.
- The display reads KEEP=OLD NEW.
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).

4) ERASE KEY PRESSURE

PURPOSE: To erase key pressure from the entire track or within a bar or key range. Let's say you've just recorded a sequence that included pressure modulating an LFO but the modulation was excessive in bar 3. You could remove pressure between keys and/or bars without affecting the note events in the track. If pressure is not part of the patch (if it is not connected to something useful), then it's a good idea to turn it off before you begin sequencing. That way you won't waste memory. You can turn pressure OFF from the EDIT/Instrument Page.

- Select ERASE KEY PRESSURE.
- Press *Enter•Yes*. The display reads TRACK ##. Select the track which contains the key pressure you want to erase.
- Press *Enter•Yes*. The display reads LO KEY=## HI KEY=##.
- Press *Enter•Yes*. The display reads BAR ## through BAR ##.
- Press *Enter•Yes*. The display reads KEEP=OLD NEW.
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).

5) ERASE KEY RANGE

PURPOSE: To erase all track data within a selected key range.

- Select ERASE KEY RANGE.
- Press *Enter•Yes*. The display reads TRACK=##. Select the track which contains the key range you want to erase.
- Select LO KEY=## HI KEY=##. Make sure LO KEY=## in the display is underlined. If you want to erase a single key event—maybe there's a snare drum on A2 you want to erase—play that key on the keyboard. Next, underline HI KEY=## and play the same note. If you want to erase the key range over a span of keys, from A2 through A3 for instance, underline LO KEY=## and play A2 on the keyboard. Underline HI KEY=## and play A3. You could also select the key range using the Up and Down Arrow buttons or the Data Entry Slider.
- Select BAR ## through BAR ##.
- Press *Enter•Yes*.
- The display reads KEEP=OLD NEW.
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).

6) ERASE PROGRAM CHANGES

PURPOSE: To delete program changes. For more on program changes see page 32 in the *Musician's Manual.*

- Select ERASE PROGRAM CHANGES.
- Press *Enter•Yes*. The display reads TRACK=##. Select the track containing the program change you want to erase.
- Select BAR ## through BAR ##.
- Press *Enter•Yes*. The display reads KEEP=OLD NEW.
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).

7) MERGE TWO TRACKS

PURPOSE: This command merges all key and controller information from one track into another track. This allows you to record several different tracks, all with the same program and MIDI configuration, then merge them into one. This is useful for creating sound-on-sound type sequences where you add rather than replace track data. You could quantize two tracks to different quantization values before merging them together.

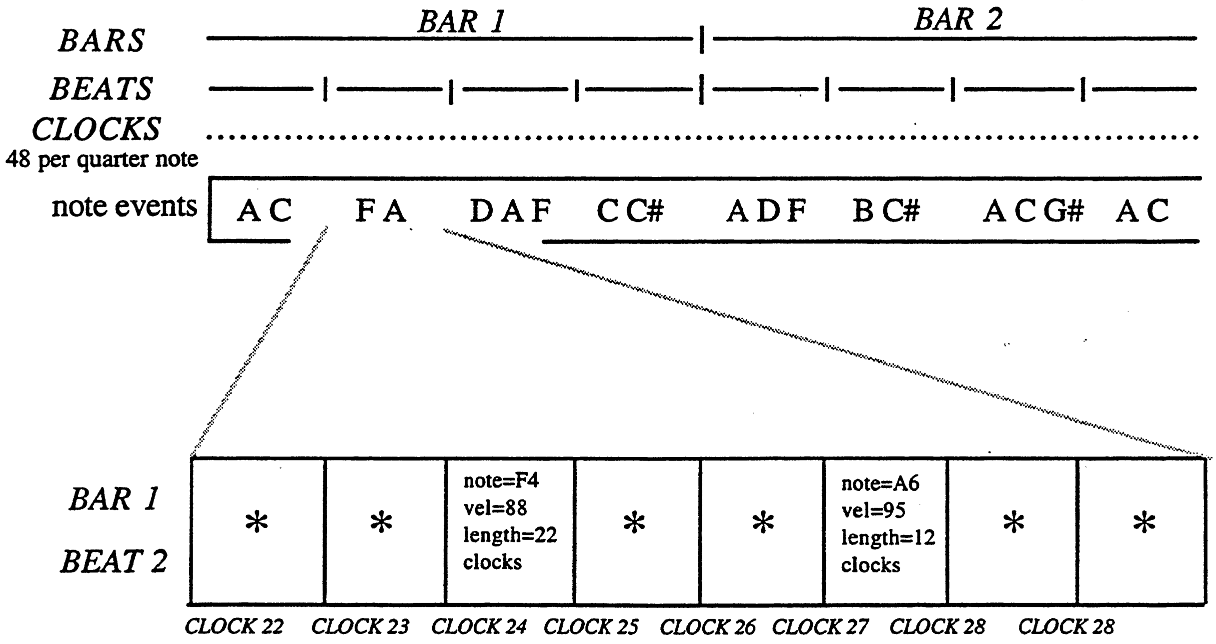
NOTE: You may run into problems if you try to merge two tracks with similar controller events. For instance, if you have pitch bend in your source track, and pitch bend in the destination track, and you merge them together at the *same point in the sequence*, it will result in "controller conflict." If this happens to you, erase the controller from one of the tracks, and then merge.

- Select MERGE TWO TRACKS.
- Press *Enter•Yes*. The display reads FROM TRACK=##. Choose a source track.
- Select TO TRACK=##. Choose a destination track.
- Select BAR ## through BAR ##.
- Press *Enter•Yes*. The display reads KEEP=OLD NEW.
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).

8) EVENT EDIT TRACKS

PURPOSE: To add, delete, lengthen, shorten, change the velocity, or the position of individual notes in a track. EVENT EDIT TRACKS is a very useful, although involved, command. Here are the fundamentals.

The sequencer uses "bars," "beats," and "clocks" to mark time during the recording of a track. The illustration below represents a stream of events recorded during two bars of a track.

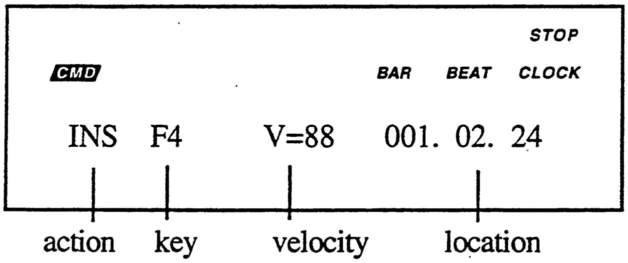


There are always 48 clocks per quarter note. The number of beats in a bar depends upon the time signature of the sequence. The number of bars depends upon the sequence length.

Sequencer tracks are made up of note events which occur at some location in the track. The location is defined in terms of bars, beats, and clocks. Note events consist of key, velocity and duration information.

In the illustration above, an event occurs at *BAR* 1, *BEAT* 2, *CLOCK* 24. The note event is key F4. It was struck at a velocity of 88 (V=88). Its NOTE LENGTH (duration) is 22 *CLOCKS*. All this information is displayed for each key event when you use the EVENT EDIT TRACK command. You can change the key, velocity, or length of any key event. You can also delete events and insert new ones.

In EVENT EDIT TRACK, the numbers on the right side of the display show the current location in the track. The location is represented in terms of *BARS*, *BEATS*, and *CLOCKS*. The two fields to the left of this are the key and velocity information fields.



STOP
CMD
BAR BEAT CLOCK
INS F4 V=88 001. 02. 24

If there are any key events at the current location, they will appear here with their corresponding velocity. If there is no key event on the current *CLOCK*, the display will show an asterisk (*) in the key field.

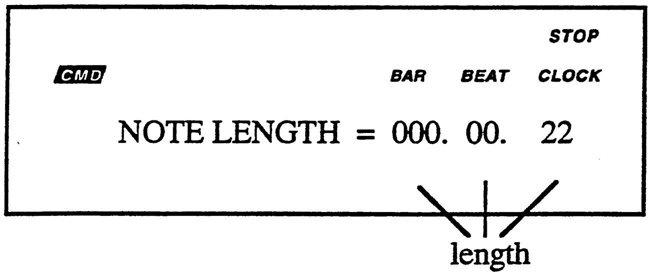
By underlining the *CLOCK* field and using the Up and Down Arrows, you can step forward or backward through the track one *CLOCK* at a time. You can also step through the track by *BEATS* or *BARS*.

If you want to step through the track one event at a time, underline the key field, and press the Up or Down Arrow button. The location field will change to show the *BAR*, *BEAT*, and *CLOCK* of each event. If more than one event is on a clock, the clock value will not change.

The left-most field in the display is the action field. This can be set to either INS (insert) or DEL (delete). This defines the action that takes place when you press the *Enter•Yes* button.

If the action is set to DEL, pressing the *Enter•Yes* button will delete the current event. If the action is set to INS, pressing the *Enter•Yes* button will insert a new event at the current location. The event that is inserted will have the key, velocity, and duration values of the last deleted event. This allows you to "move" key events from one location to another.

To see the duration of an event, scroll off the page to the right. The display will show the NOTE LENGTH (duration) in *BARS*, *BEATS*, and *CLOCKS*.



STOP
CMD
BAR BEAT CLOCK
NOTE LENGTH = 000. 00. 22

STEP BY STEP EVENT EDITING

- Create a sequence (see page 36 of the *Musician's Manual*). After you've created a sequence and recorded a track...
- Press *Command*, then *Track*.
- Select EVENT EDIT TRACKS.
- Press *Enter•Yes*. The display reads something like this, INS *_ V=0 001. 02. 35.
- Press the Up Arrow button. This lets you step *forward* through your sequence to hear it note by note.
- Make sure the note you want to EVENT EDIT is selected in the display.

The actual notes chosen for this exercise and their values are not important. What's important is that you get a feel for the procedure.

First, let's change the velocity of an individual note...

- Underline V=## in the display and change the velocity using the Up/Down Arrow buttons or the Data Entry Slider.
- **Press *Cancel•No* to exit event editing. This will let you audition your edit on the KEEP=OLD NEW Page.**
- Press *Enter•Yes* to keep the changed version, or *Cancel•No* to keep the original version.

To change the length of an individual note...

- Press *Command*, then *Track*. Scroll to EVENT EDIT TRACKS and press *Enter•Yes*.
- Scroll right through the display to the NOTE LENGTH parameter. You can lengthen or shorten an individual note by clocks, beats, or bars.
- For example, underline *BAR* and set that to 02. Underline *BEAT* and set that to 03. Underline *CLOCK* in the display and set that to 40. This sets the note to have a length of 2 bars, 3 beats, and 40 clocks.
- **Press *Cancel•No* to exit event editing. This will let you audition your edit on the KEEP=OLD NEW Page.**
- Press *Enter•Yes* to keep the changed version, or *Cancel•No* to keep the original version.

To assign an individual note to a different clock in your track (i.e., to move a note forward or backward in time)...

- Press *Command*, then *Track*. Scroll to EVENT EDIT TRACKS and press *Enter•Yes*.
- Make sure the display reads something like this, INS *_ V=0 001. 02. 35. Use the Up and Down Arrow buttons to select the note you wish to move.
- Underline INS and change it to DEL. Press *Enter•Yes*.
- Scroll right to underline the numerals in the display under *CLOCK*. Let's advance the note by five clocks...
- Use the Up Arrow button to advance the *CLOCK* by 5 clocks.
- Scroll back to and Underline DEL in the display and change it to INS.
- Press *Enter•Yes*. The EPS automatically inserts the note five clocks ahead. You can follow the same procedure to move note forward or backward by bars or beats. Simply underline the number under *BAR*, *BEAT*, or *CLOCK*, then use the Up/Down Arrow buttons or the Data Entry Slider to change the notes location.

Let's delete a note and insert a new one in its place...

- Press *Command*, then *Track*. Select EVENT EDIT TRACKS and press *Enter•Yes*.
- Use the Up or Down Arrow buttons to locate the note you want to delete. Now play the new note on the keyboard. The EPS automatically inserts this new note into the current location.
- **Press *Cancel•No* to exit event editing. This will let you audition your edit on the KEEP=OLD NEW Page.**
- Press *Enter•Yes* to keep the changed version, or *Cancel•No* to keep the original version.

9) TRANSPOSE TRACK
PURPOSE: To transpose notes in a track by as much as an octave, up or down.

- Select TRANSPOSE TRACK.
- Press *Enter•Yes*. The display reads TRACK=##.
- Select TRANSPOSE AMOUNT=## (Range -12 to +12 semitones).
- Select LO KEY=## HI KEY=##. Choose a key range.
- Select BAR ## through BAR ##. Choose a bar range.
- Press *Enter•Yes*. The display reads KEEP=OLD NEW.
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).

- SCALE CONTROLLER
PURPOSE: To increase or decrease the effect of a controller in a track.

- Scroll to SCALE CONTROLLER.
- Press *Enter•Yes*. The display reads TRACK=##.
- Scroll to BAR ## THRU BAR ##.
- Scroll to SCALE=__. The controllers on this page include: PITCH WHEEL, MOD WHEEL, XCTRL, PEDAL, VOLUME, and MONO PRESSURE.
- Scroll to SCALE BY ##. The Data Entry Slider scales the controller by whole values; the Up and Down Arrow buttons scale it by fractions. Values of less then 1.00 will decrease the effect of a controller. Values greater than 1.00 will increase the effect of a controller in a selected track.
- Press *Enter•Yes*. The display reads KEEP=OLD NEW.
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).

- SHIFT TRACKS BY CLOCKS
PURPOSE: To shift all note events on a track forward or backward in time. This can be useful for correcting MIDI delay, or creating a "lazy" or "rushed" feel when a track is moved in time relative to other tracks.

- Scroll to SHIFT TRACKS BY CLOCKS.
- Press *Enter•Yes*. The display reads TRACK=##.
- Scroll to SHIFT AMOUNT=## (Range -48 to +48 clocks).
- Scroll to BAR ## through BAR ##.
- Press *Enter•Yes*. The display reads KEEP=OLD NEW.
- Press *Enter•Yes* to complete the command (or *Cancel•No* to abort the procedure).

EDIT/Seq•Song Page

PURPOSE: See pages 35-36 in the *Musician's Manual.*

EDIT/Track Page

0) TRACK STATUS (Mute/Play/Solo)
PURPOSE: See page 39 of the *Musician's Manual.*

1) TRACK MIX (O.S. version 1.95 and higher)
PURPOSE: The EPS stores track mix information for each track of a sequence. When you record a sequence track, the track mix will be recorded into the track. When you play a sequence back, each track will have the correct volume balance. See page 39 of the *Musician's Manual.*

After you've created a sequence, if you want to change the mix volume in a given track:

- Go to the EDIT/Sequence Page and set RECORD MODE to ADD.
- Go to the EDIT/Track Page and set the track mix to the desired starting value. It may help to play the sequence and adjust the mix while listening to the track until you find the proper level.
- While holding down *Record*, press *Play*. After the first bar of the sequence, press *Stop/Continue*.
- Select KEEP=NEW. You have now recorded a new mix volume in that track. You can't audition the volume change on the KEEP=OLD NEW Page. However, you will hear the volume change after you've chosen KEEP=NEW. If you don't like the mix after you've chosen KEEP=NEW, simply repeat the above procedure and set a new volume level.
- It's a good idea to return to the EDIT/Sequence Page to set the RECORD MODE back to REPLACE for later sequencing.

MIXDOWN

If you record a song track on an Instrument which has sequence tracks defined, the track mix information in the song track overrides the sequence information. In addition, when you are recording a song track, any changes that you make to the track mix during recording will be recorded in the song track. This allows you to create fade in/out assignments while the sequence is in progress.

2) TRACK PAN

PURPOSE: See page 39 of the *Musician's Manual.*

TECHNICAL INFORMATION

MIDI Sys-Ex External Command and SCSI Data Transfer documents are available to designers and programmers of editing programs. For this information, send your request and project specifications to ENSONIQ Customer Service, 155 Great Valley Parkway, Malvern, PA 19355.

TECHNICAL SUPPORT

If you have any questions concerning the use of your EPS, please contact the authorized **ENSONIQ** dealer where you purchased your EPS. For additional technical support, you may call **ENSONIQ** customer service at (215) 647-3930 Monday through Friday from 9:30 a.m. to 6:30 p.m. Eastern Standard Time.

When contacting a service center or ENSONIQ Customer Service, it would be helpful to have the following information ready:

- Serial Number of you unit (it is located on the back panel).
- EPS O.S. Disk Version number that you are using.

SYSTEM ERROR MESSAGES

Occasional system errors are not unusual and unless they become chronic, they are not a cause for concern. One system error message that is helpfult to you is System Error 144. This error is telling you that the EPS is receiving too much MIDI data for it to handle.

EPS INSTRUMENT INFO SHEET

The form on the following page can be used to record the internal parameters of EPS Instruments you create, or to help you gain an understanding of Instruments you acquire from ENSONIQ or other sources. Feel free to photocopy it and use the copies document your EPS sounds.

EPS INSTRUMENT INFO

Instrument Name:	# of Blocks:	Disk #:
Created by:	Source:	Key range: to
KeyDown Layers: 1 2 3 4 5 6 7 8	MIDI Out Chan:	Pressure Mode:
KeyUp Layers: 1 2 3 4 5 6 7 8	MIDI Out Prog:	Send Keys to:

00 PATCH (no buttons down):		Layers enabled in Patch: 1 2 3 4 5 6 7 8
M O	Pressure:	Velocity:
D S	MOD Wheel:	Other:
Description/Performance notes:		

0* PATCH (right button down):		Layers enabled in Patch: 1 2 3 4 5 6 7 8
M O	Pressure:	Velocity:
D S	MOD Wheel:	Other:
Description/Performance notes:		

*0 PATCH (left button down):		Layers enabled in Patch: 1 2 3 4 5 6 7 8
M O	Pressure:	Velocity:
D S	MOD Wheel:	Other:
Description/Performance notes:		

** PATCH (both buttons down):		Layers enabled in Patch: 1 2 3 4 5 6 7 8
M O	Pressure:	Velocity:
D S	MOD Wheel:	Other:
Description/Performance notes:		